Figure 1

Coordination Interfaces

Figure 2

Token successor

Token (access right)

Figure 3B

Controller

access

sucessor

Figure 3A

Figure 4B

Figure 4A

Exported
state port
502

Imported
state port
504

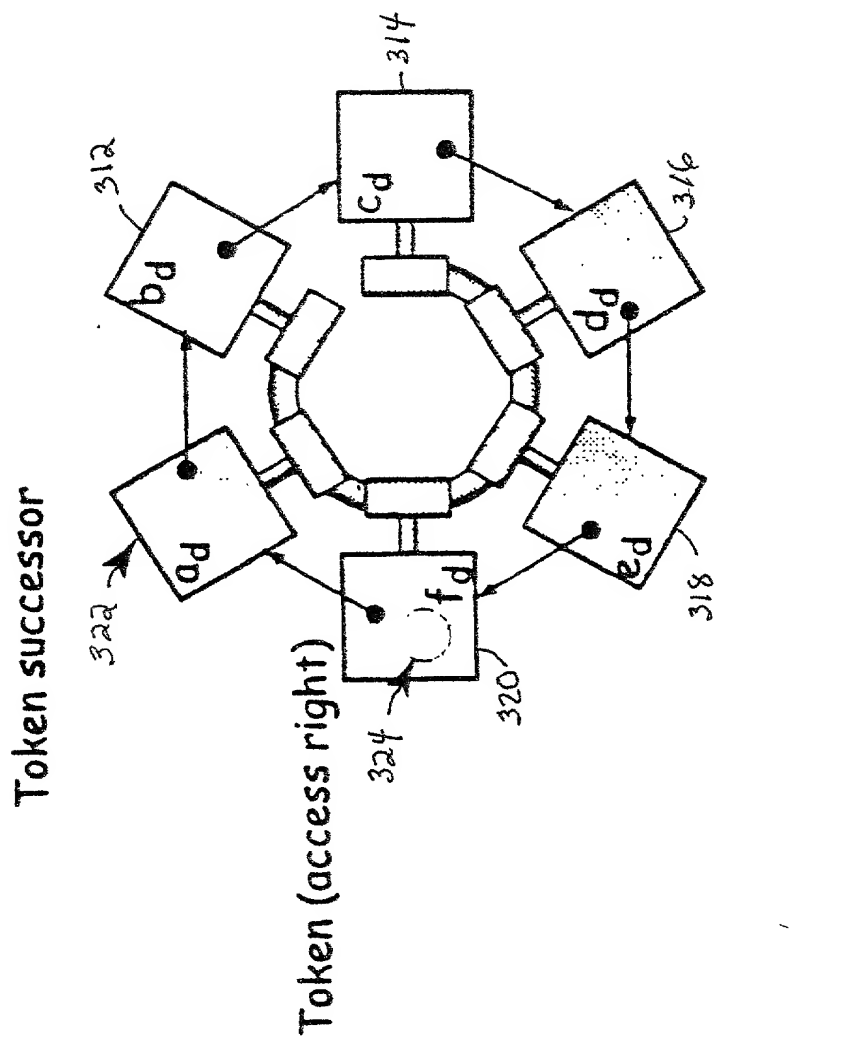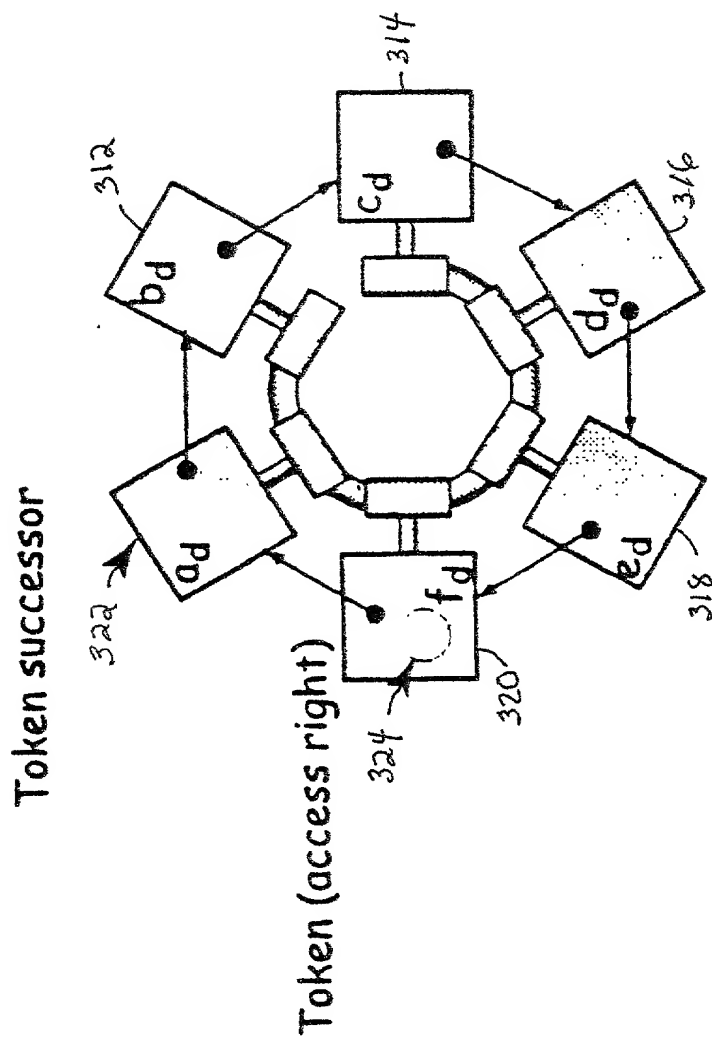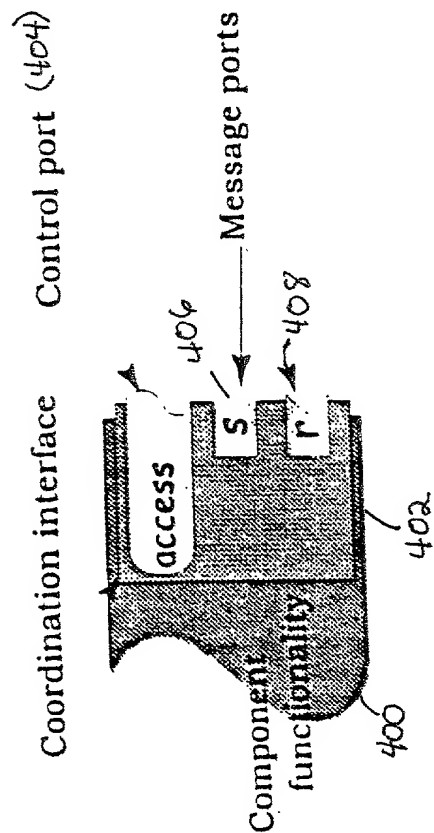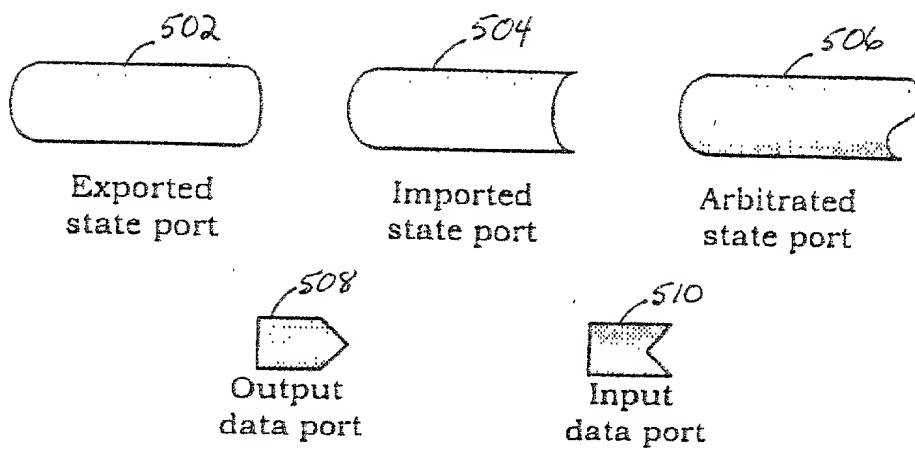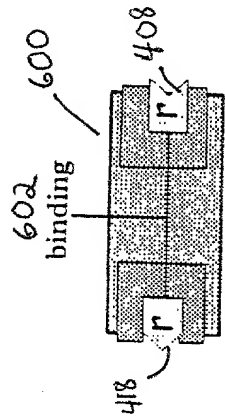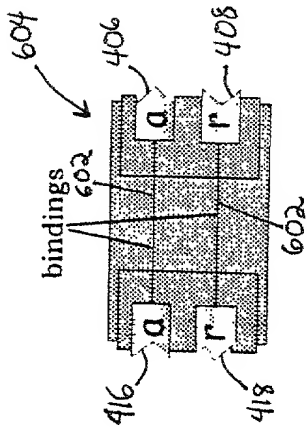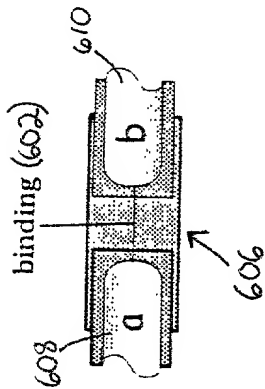Arbitrated
state port
506

Output
data port
508

Input
data port
510

Figure 5

binding (602)

Figure 6A

Figure 6B

Figure 6C

Figure 6D

704 702 700

subsume

706 C

Components

710 712

subsume subsume

708 714 C C

n Controller
interfaces

subsume subsume

C C

708

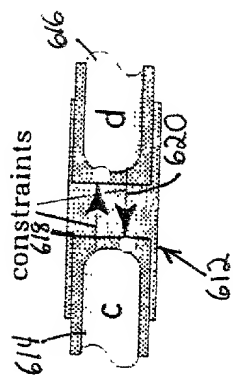718 730

Slave
interface

C C

716 720 722

Figure 7

810 808 806 804 800 802

wait wait

wait wait

wait wait

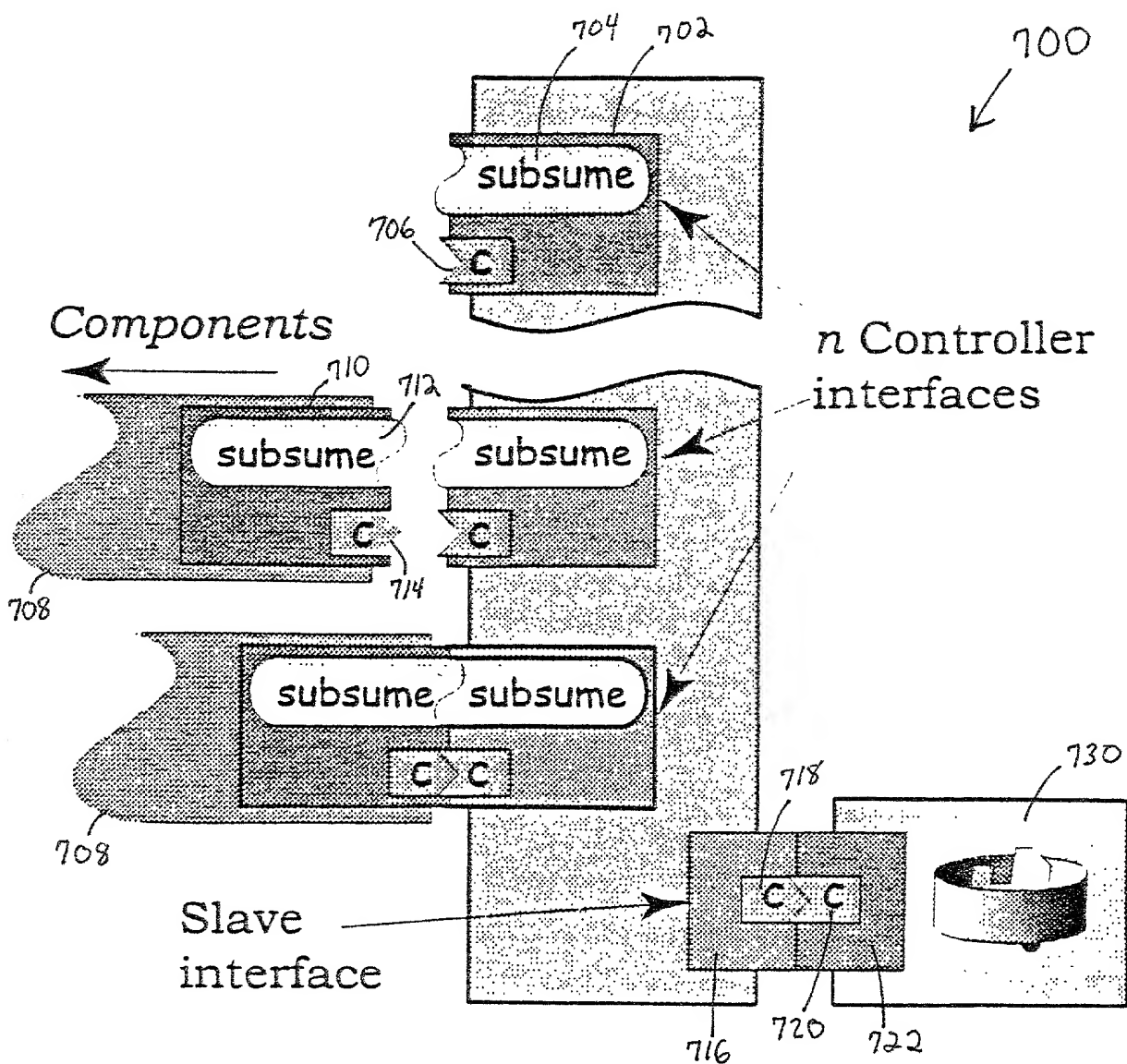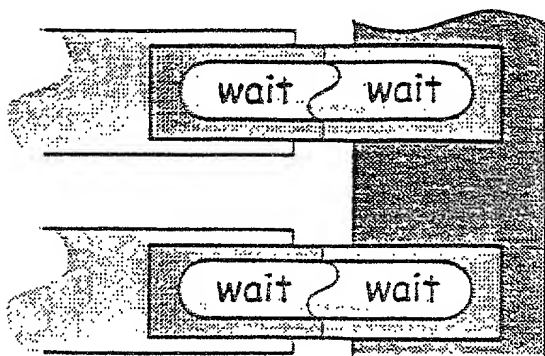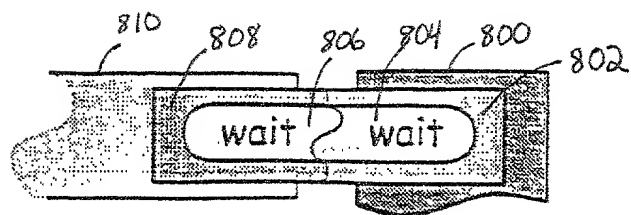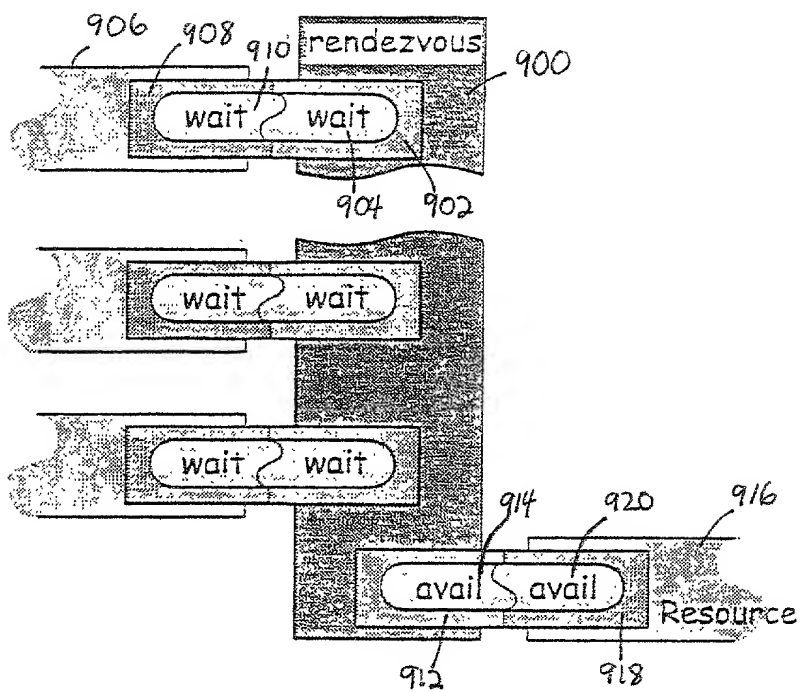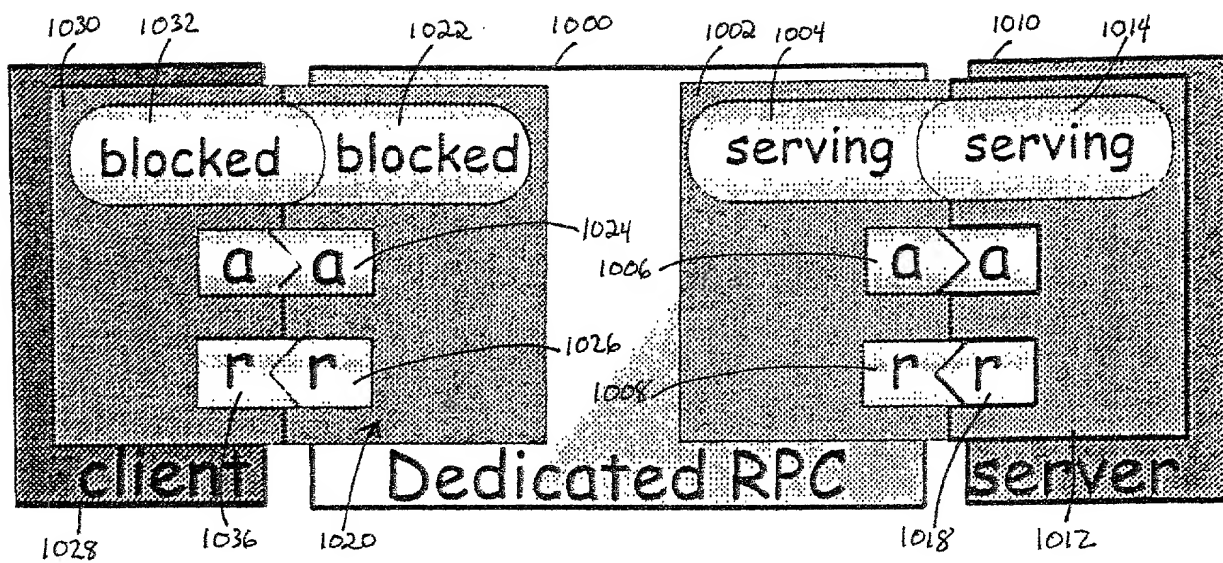Figure 8

Figure 9

Figure 10

Figure 11

Figure 12A

Figure 12B

Figure 13

Figure 14

1500

1504

1502

CDMA

TDMA

Base station

Wireless Devices — 1506

Switching center — 1508

Telco

Internet — 1512

1510

Figure 15

Figure 16

Call Logs

out

r out c

rc

rcurrent

current

current

c c

rr

sc

scurrent

Up

Adap1

in

sr

Adap2

win in

r r

Receive
log

out

s out c

c c

current

win in

r r

current

current

Send
log

Figure 17B

GUI Subsystem

LCD screen

time time

RPC
Client

time

Adan
Coord

Keypad

send disconnect

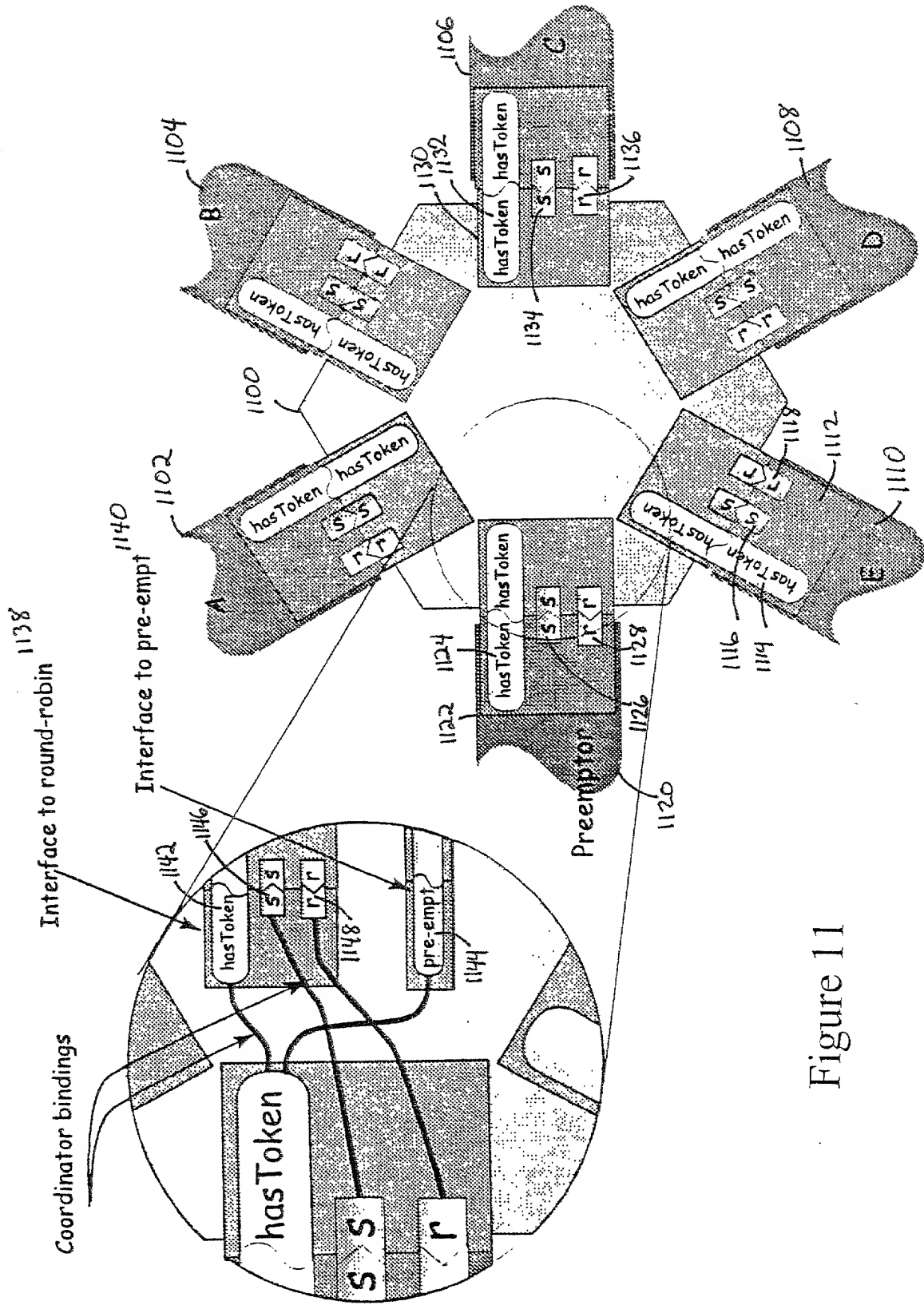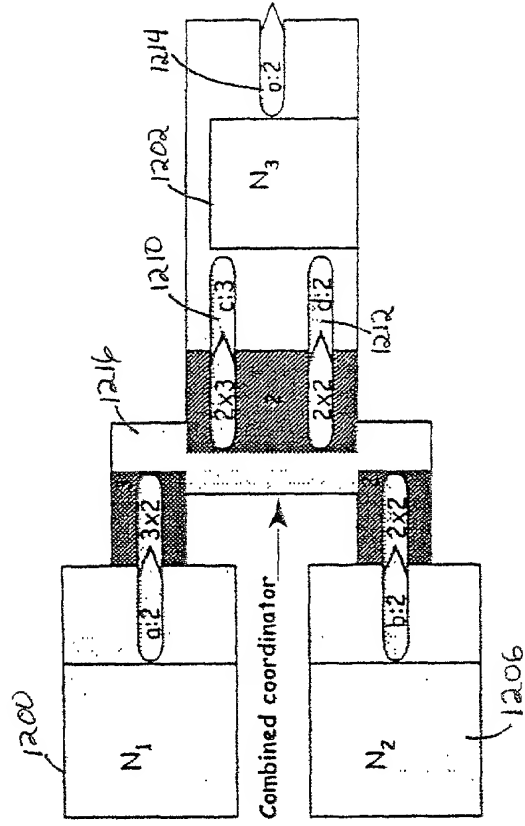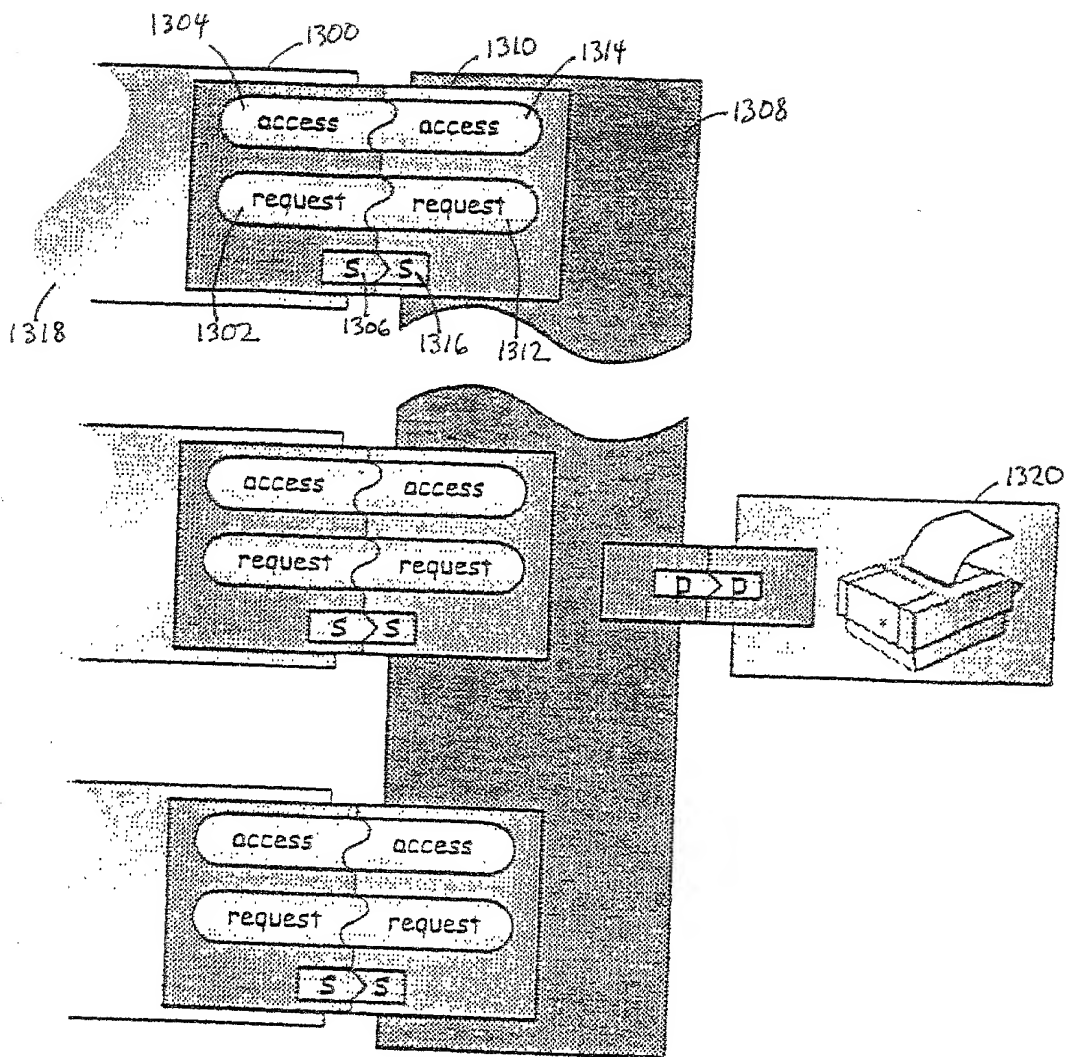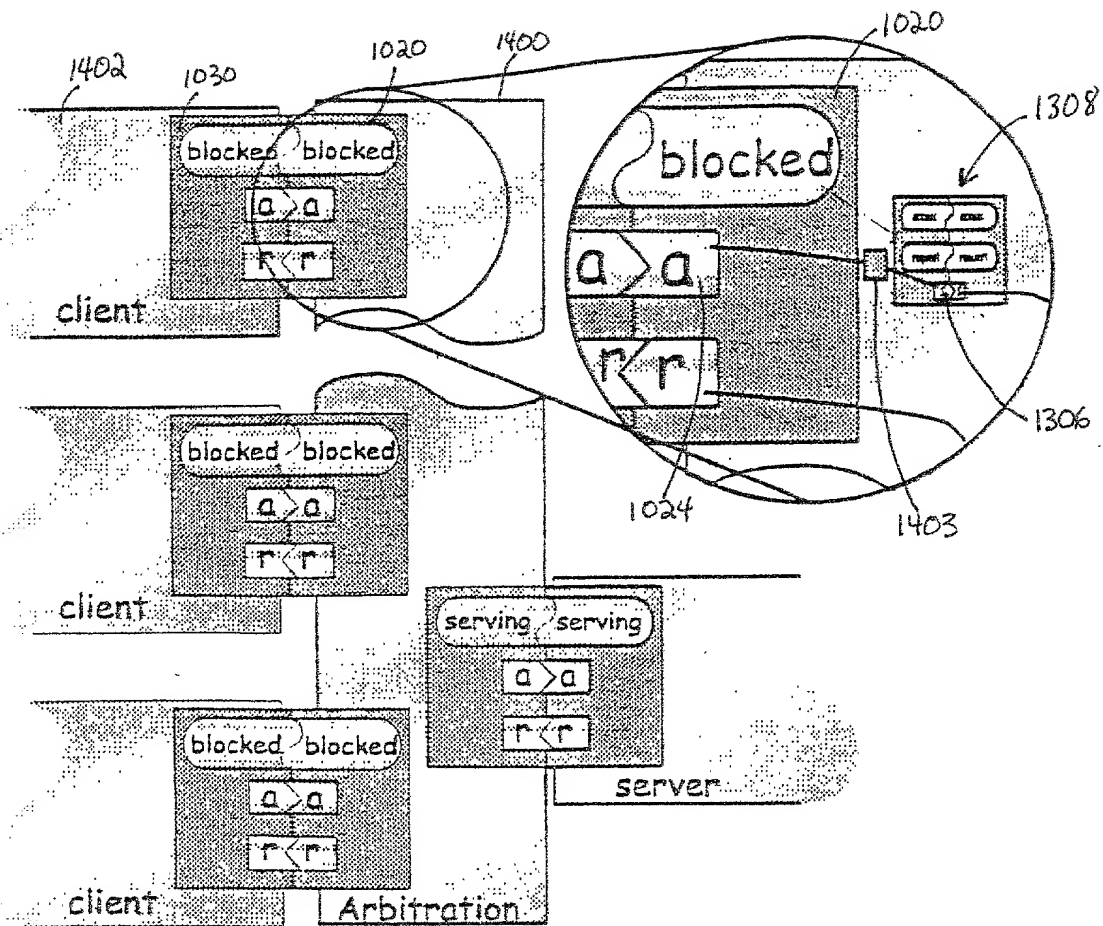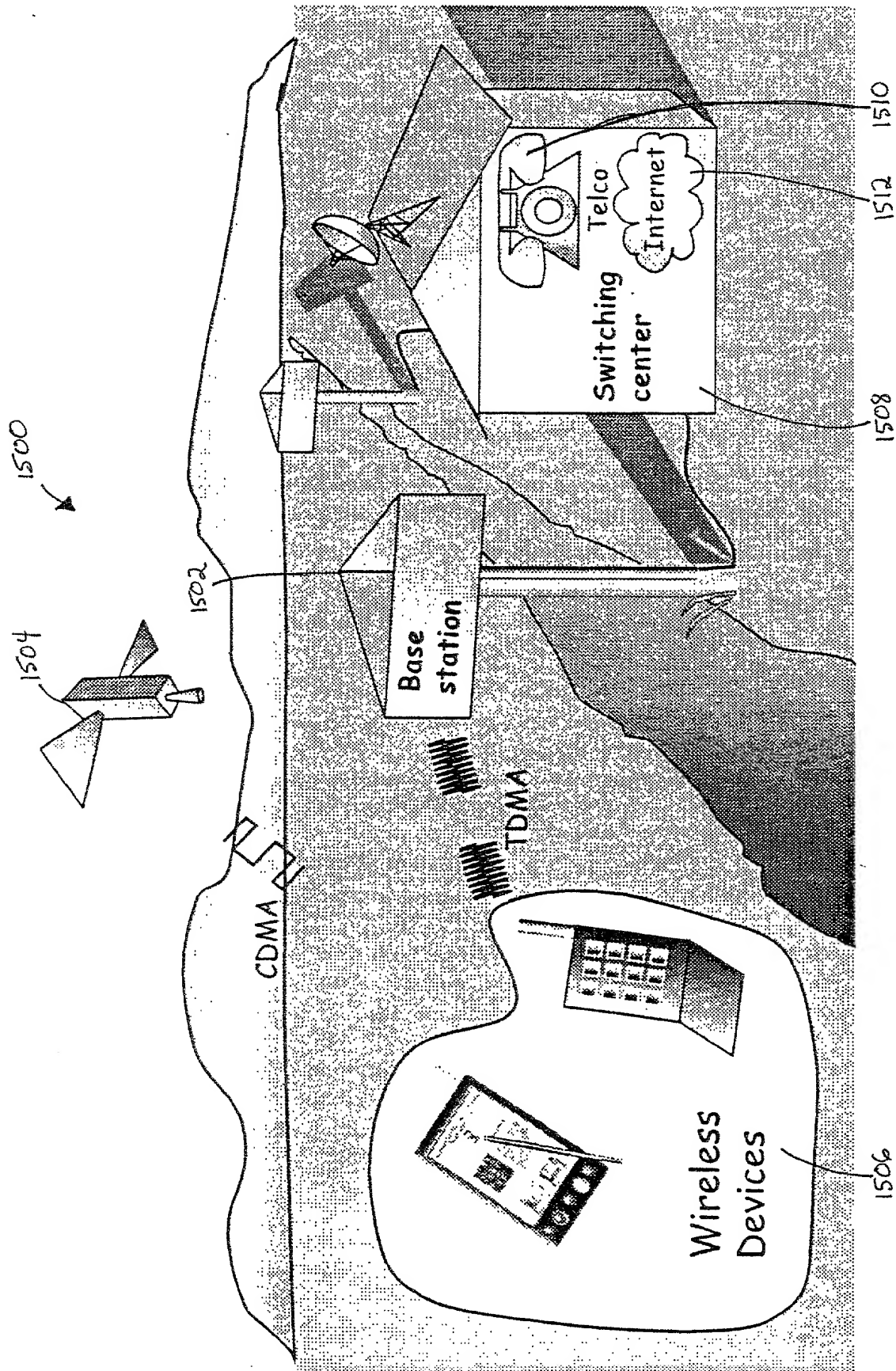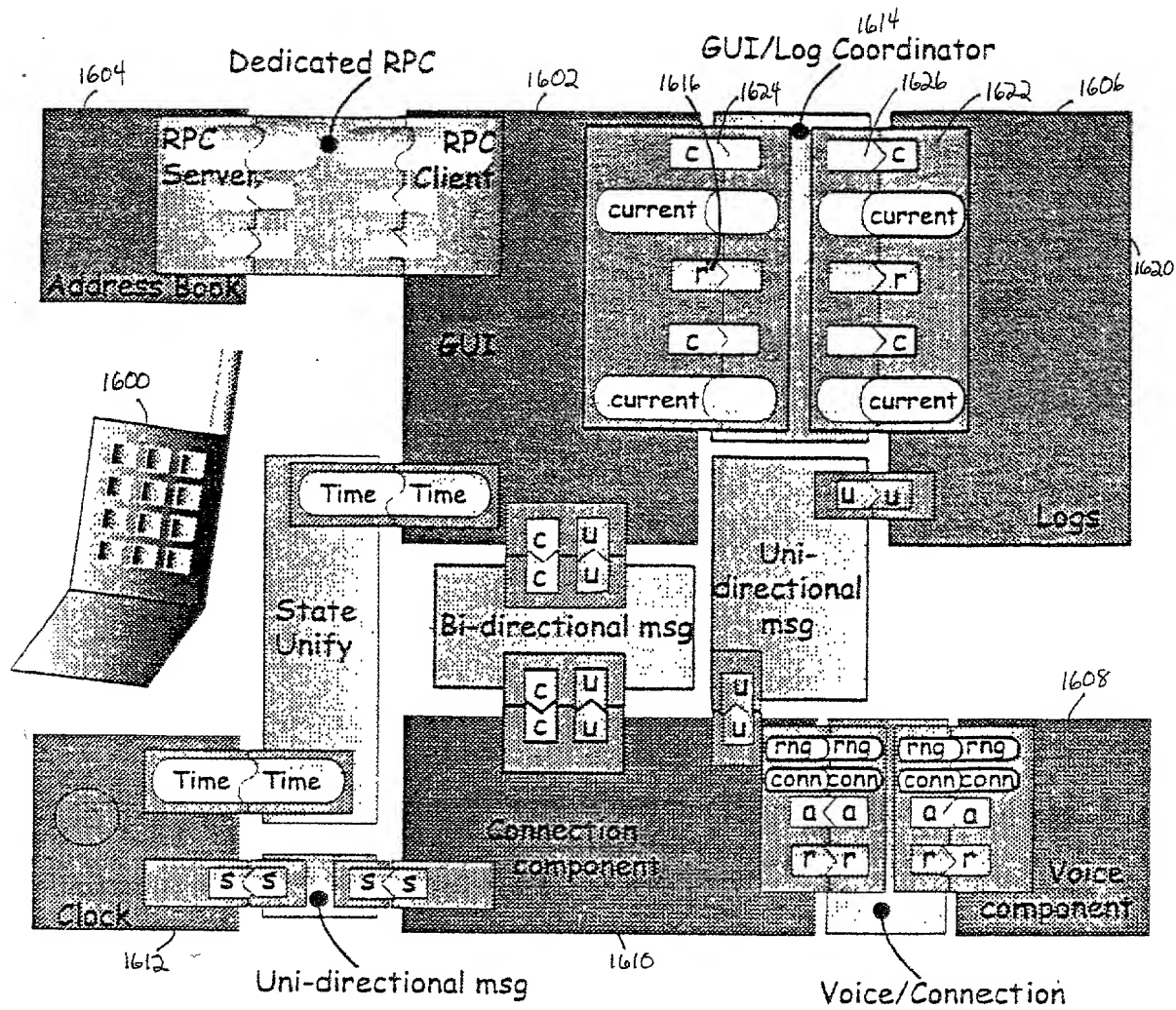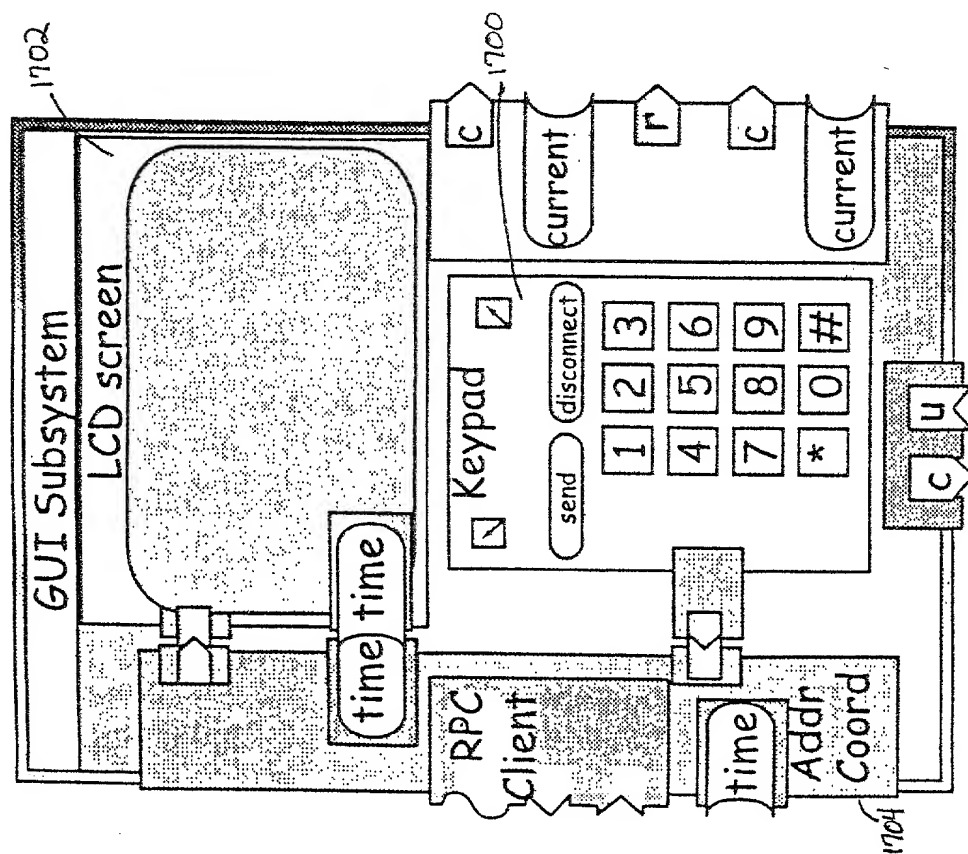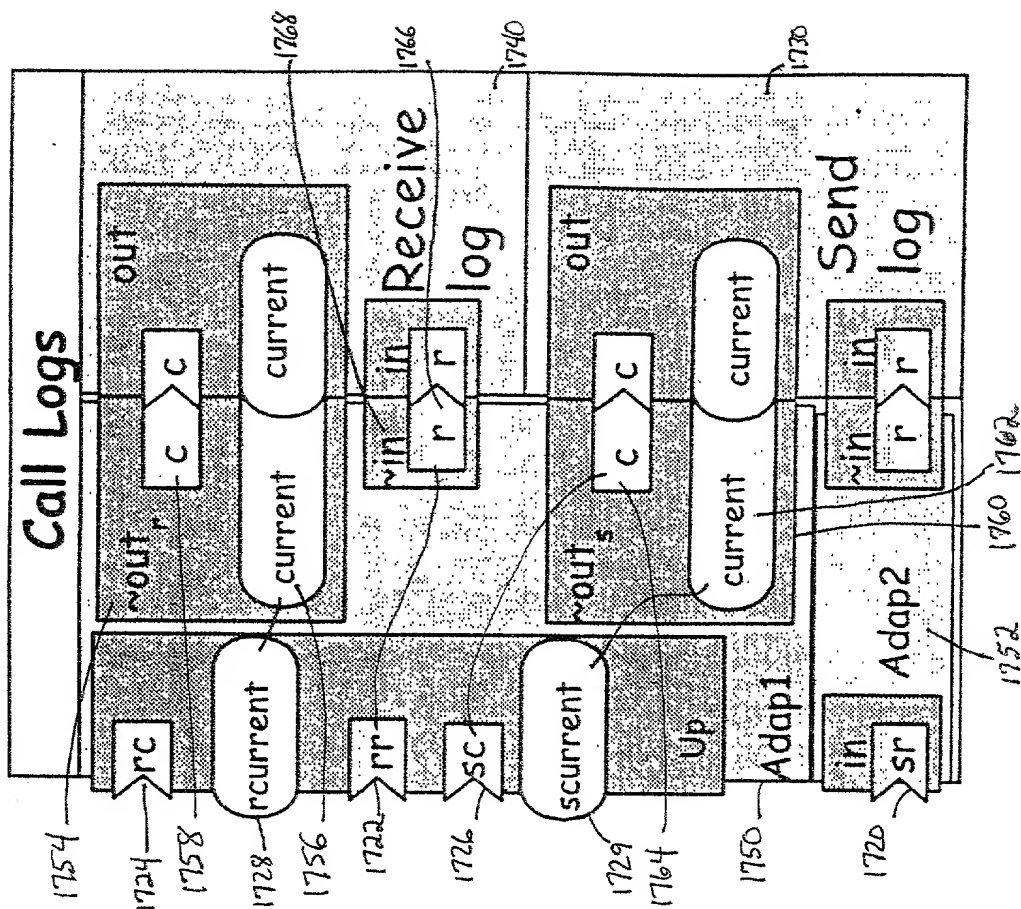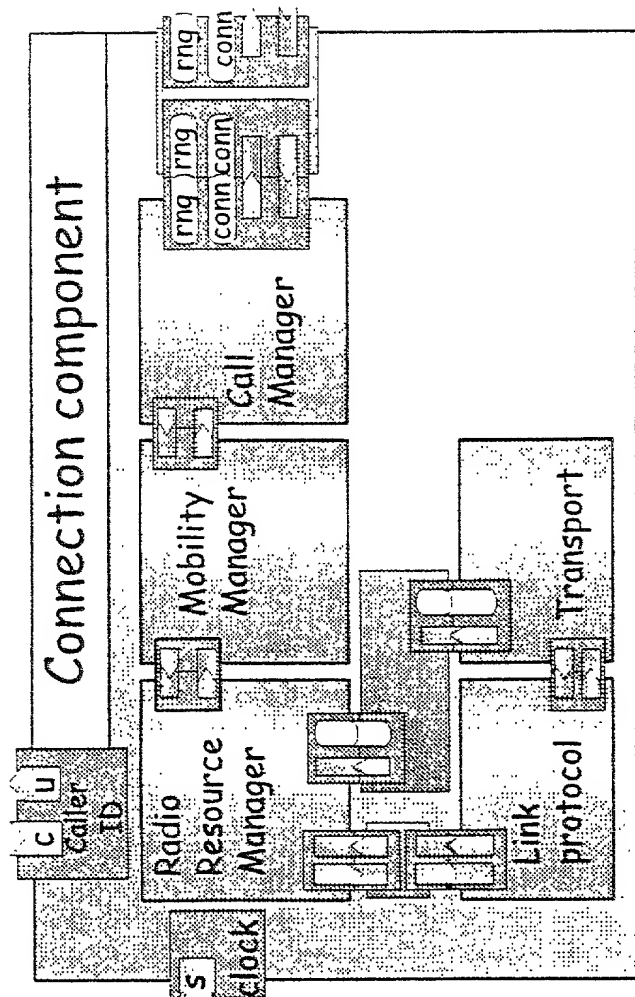| 1 | 2 | 3 |
4	5	6
7	8	9
*	0	#

c

current

r

c

current

c u

Figure 17A

Figure 18B

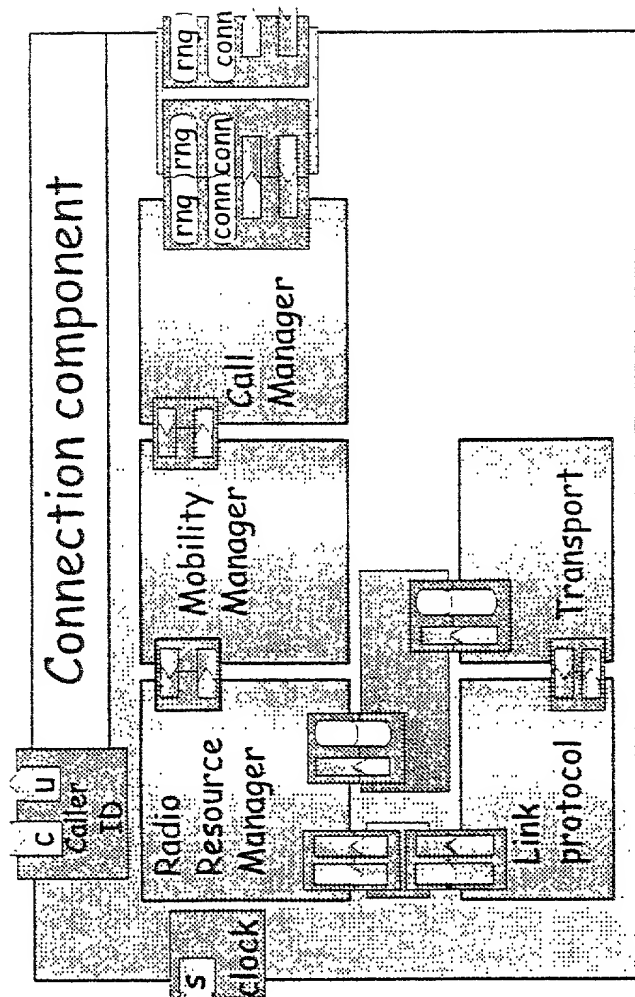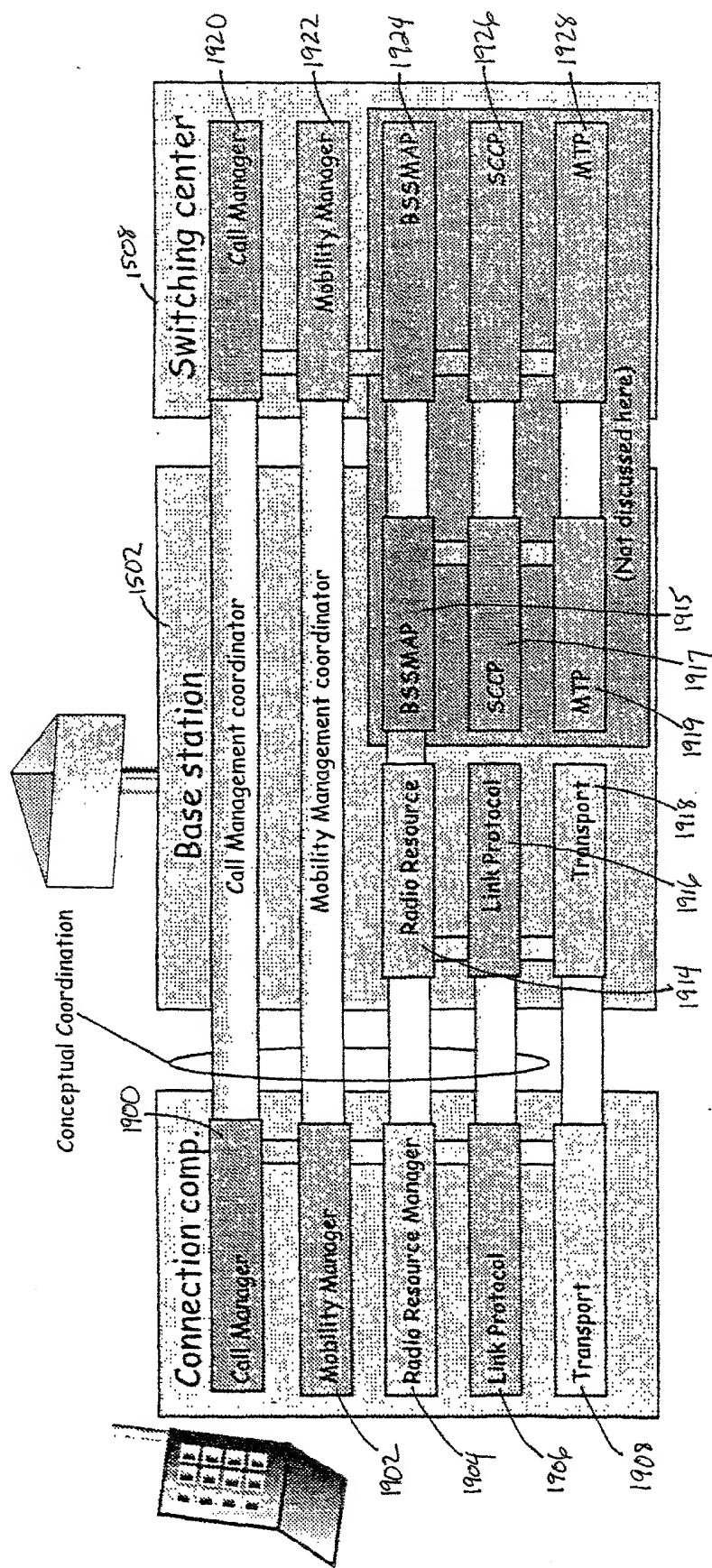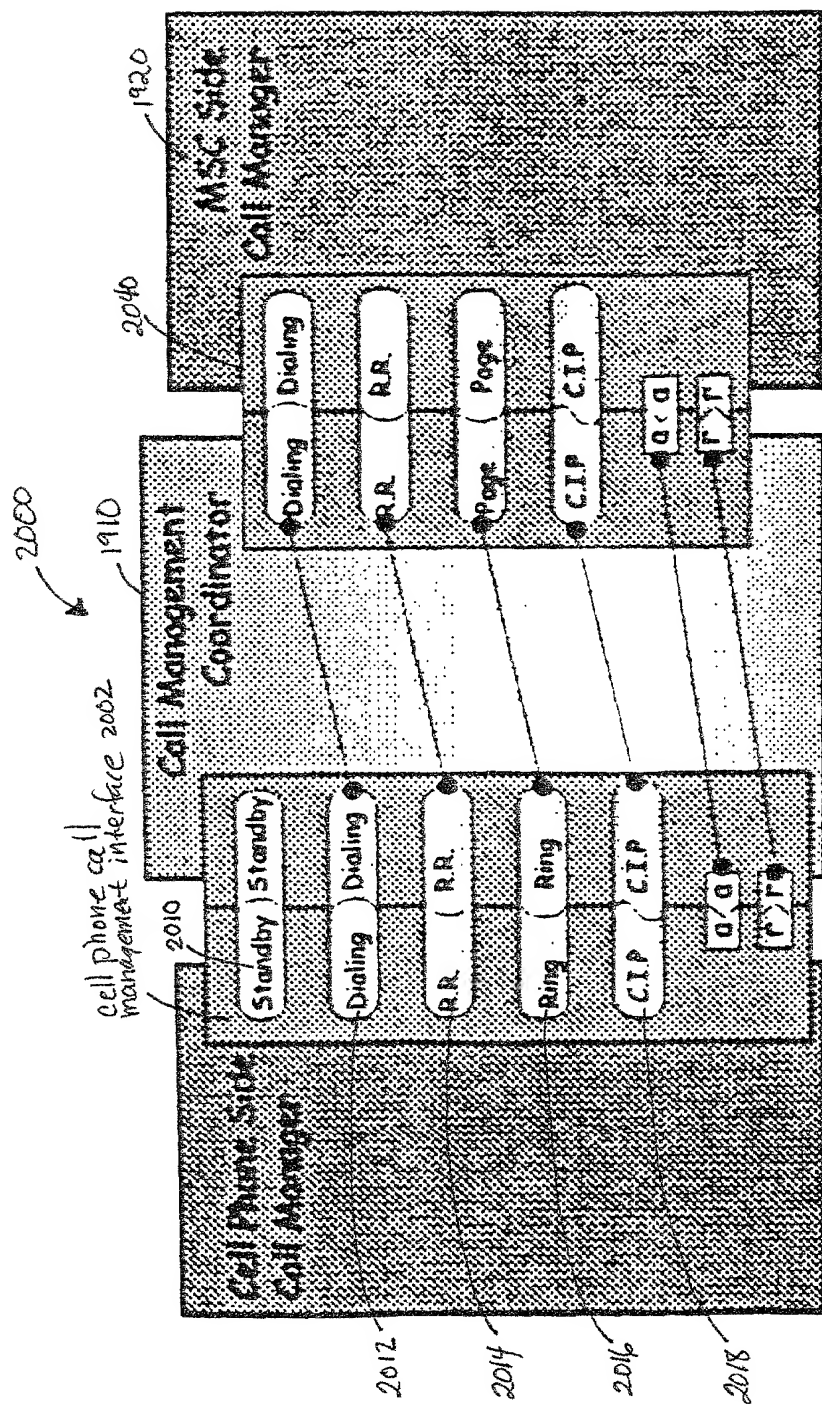Figure 18A

Figure 19

Figure 20

Figure 21B

Figure 21A

Figure 22

2300

Touch screen

LCD screen

2302

Touch pad

2304

Figure 23A

2350

Web Access

Page Formatter

2358

Disp

2354

Point

2356

Char

Page fetch

Conn

2352

Figure 23B

2450

WubbleU GUI

2400

Bi-directional msg

604

Connection subsystem

Figure 24B

2350

2400

WubbleU GUI

2300

Touch screen

LCD screen

Touch pad

Web Access

Web Formatter

Plug- Formatter

Disp

Point

Char

Page Fetch Conn

Pen stroke recognizer

2402

Figure 24A

2500

P₁ P₂ P₃
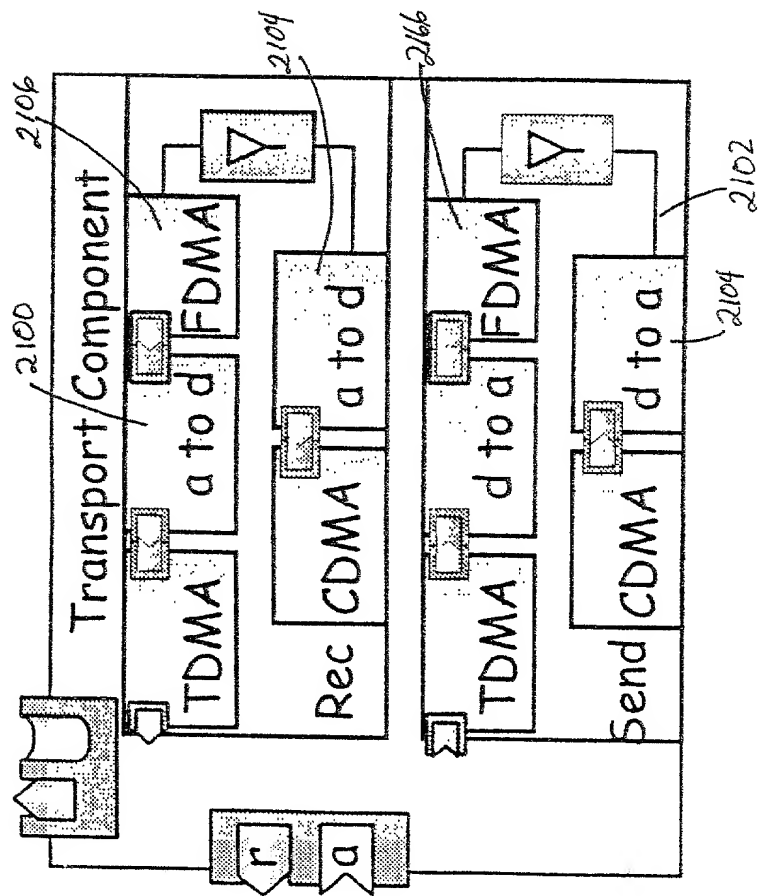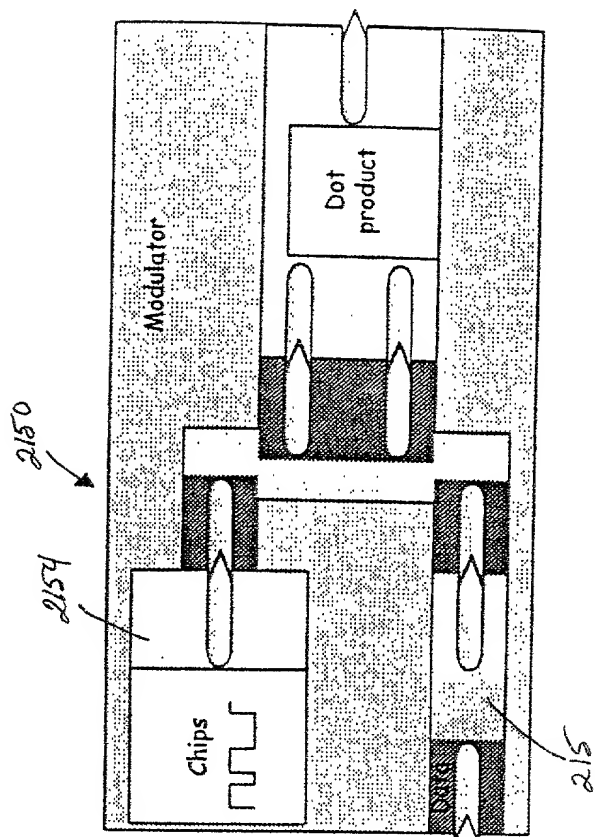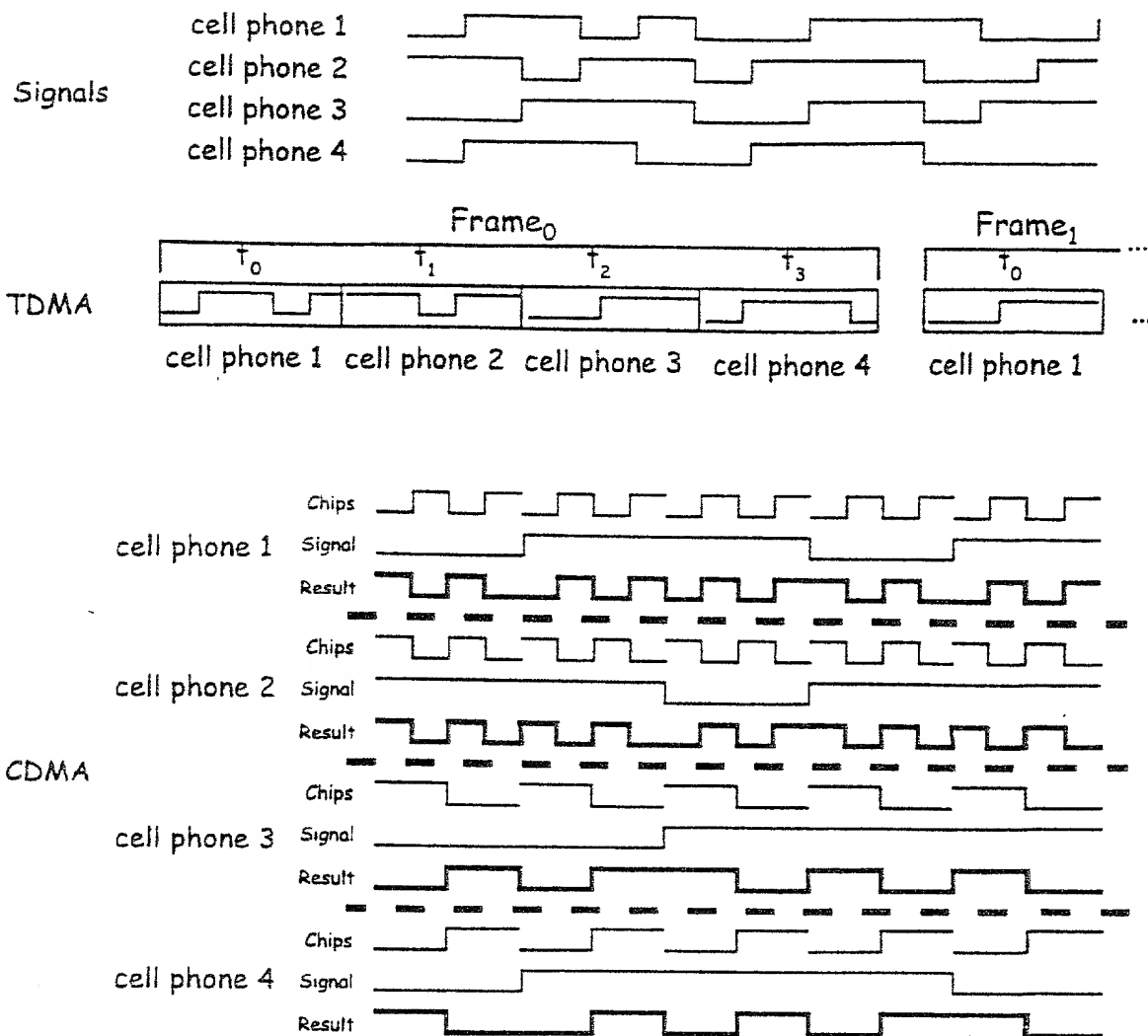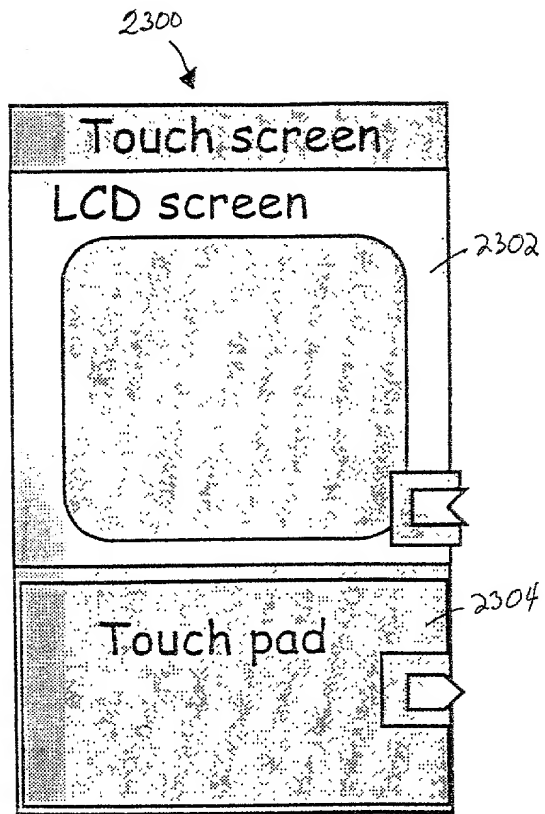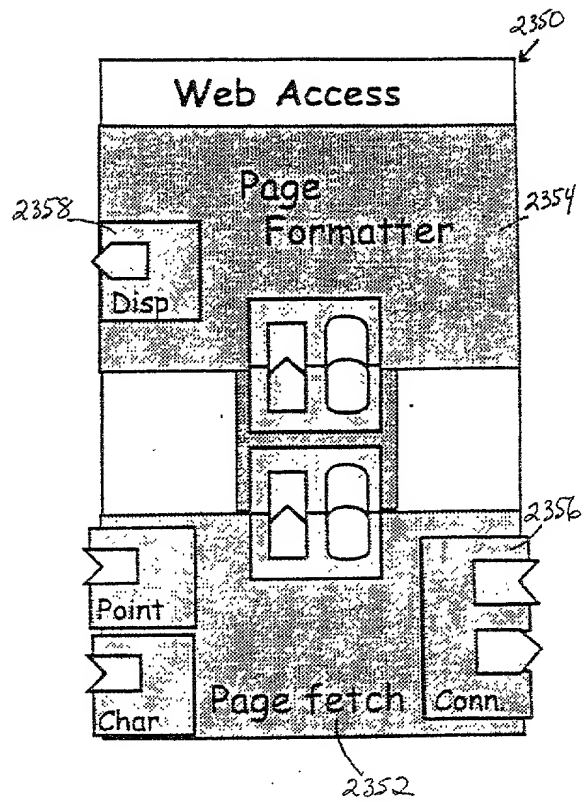
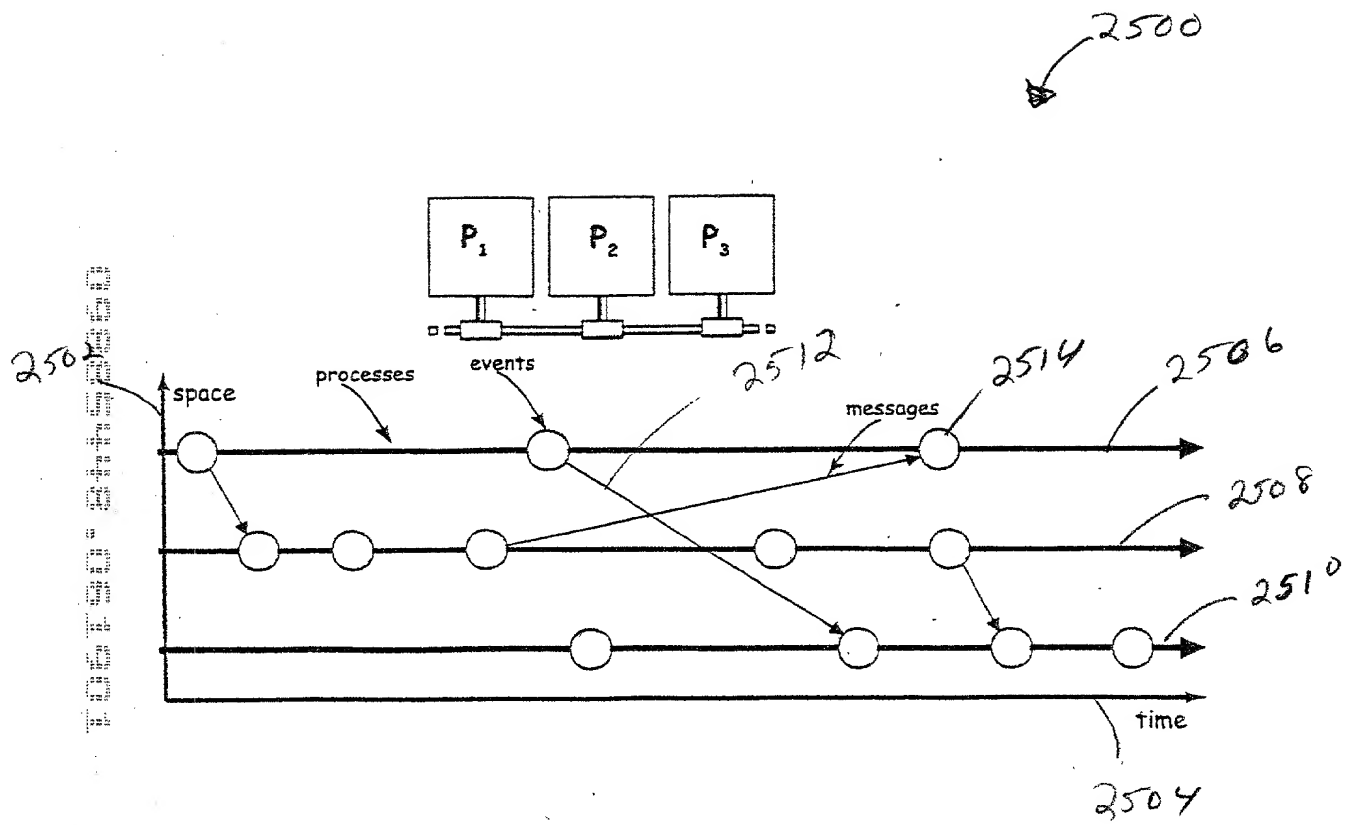2502

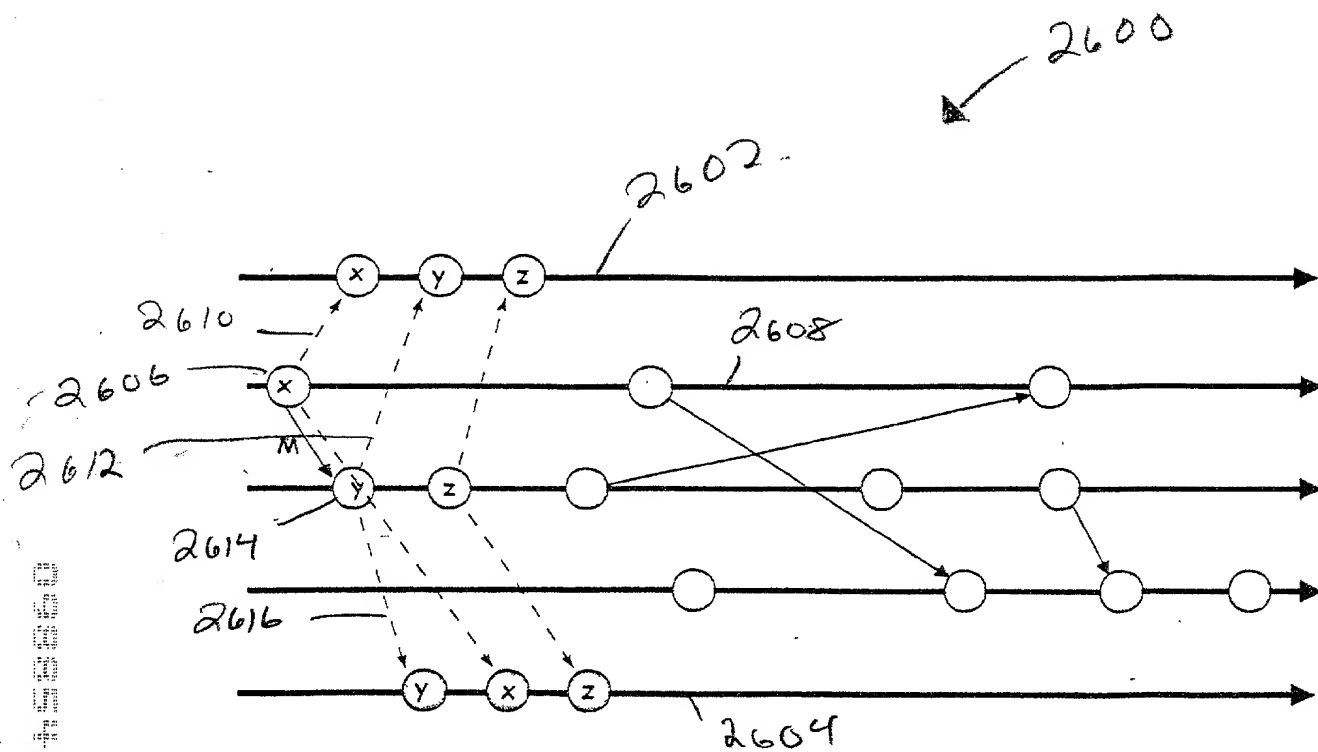space

processes   events   2512   messages   2514   2506
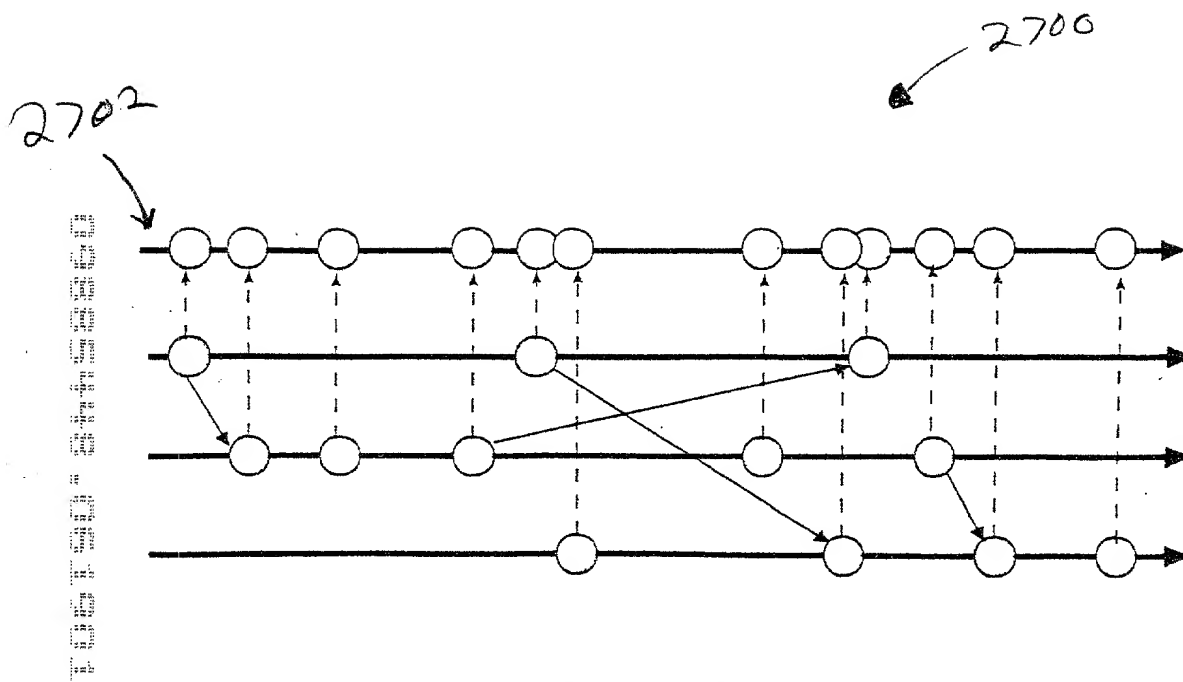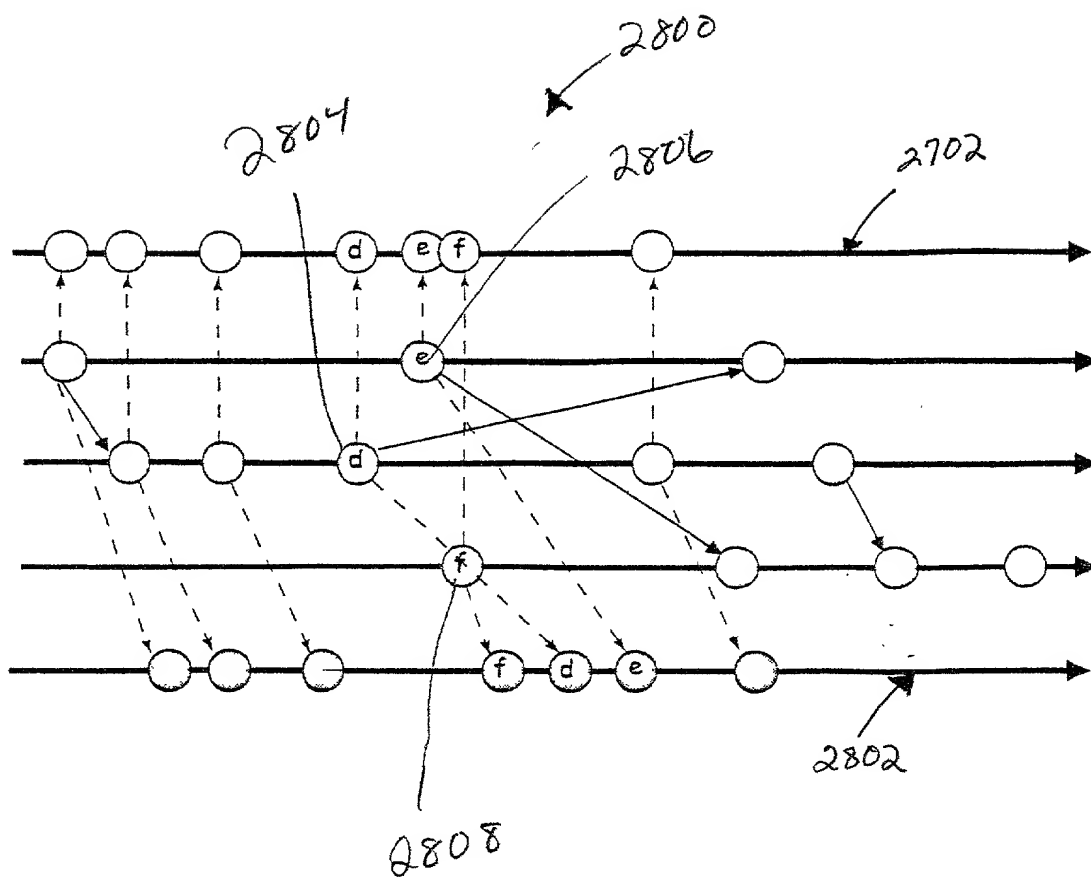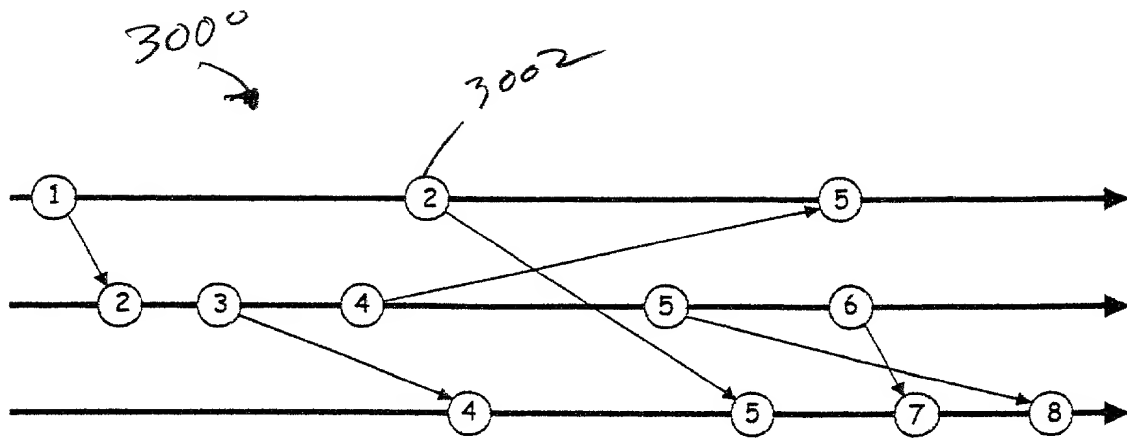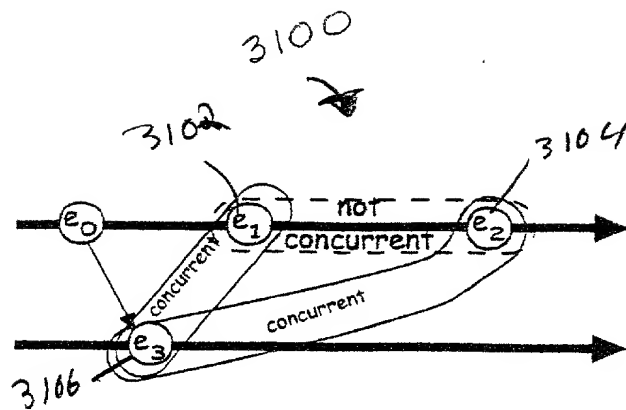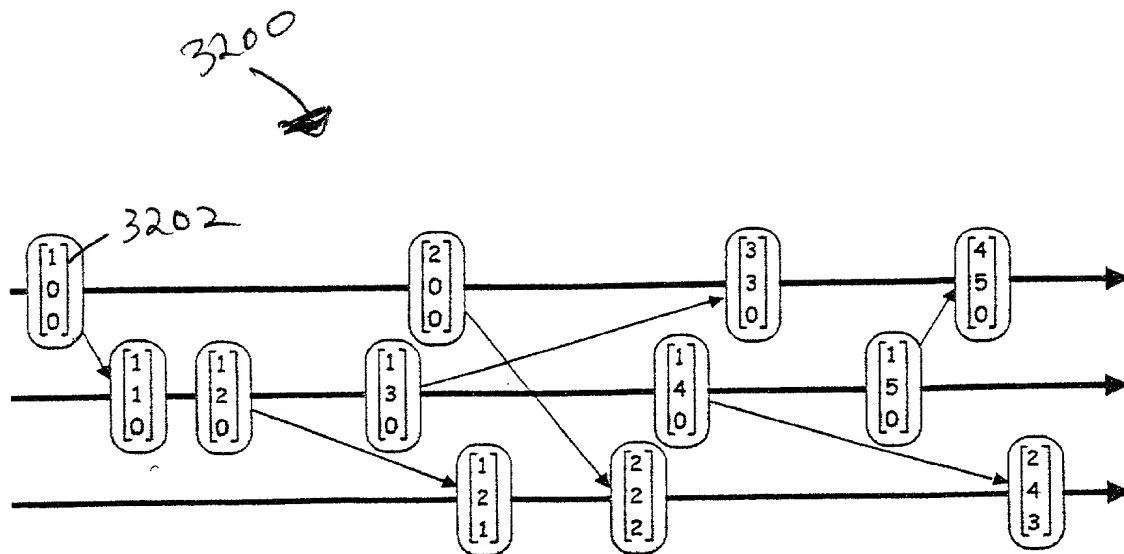
2508

2510

time

2504

Figure 25

Figure 26

Figure 27

Figure 28

Figure 29

Figure 30

Figure 31

Figure 32

3300

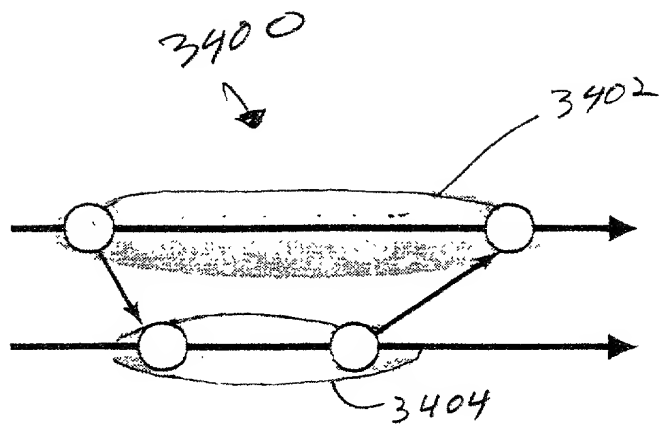| asynchronous communication	synchronous communication	process begin & end
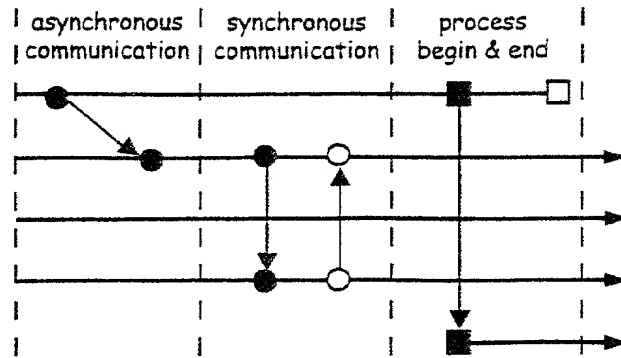
Figure 33

Figure 34

Figure 35

3600

3602   3604   3608

Source code

```
┌─────────────┐          Event    ┌──────────┐  Processed    ┌──────────┐
│             │          trace    │ Event    │  Event trace  │ Event    │
│ Event Sensor│ ─────────────────▶│ Generator│ ─────────────▶│ Handler  │
│             │                   │          │               │          │
└─────────────┘                   │          │               │          │
                                  └──────────┘               └──────────┘
```

Event Sensor

Event Generator

Event Handler

Event
trace

Processed
Event trace

3606

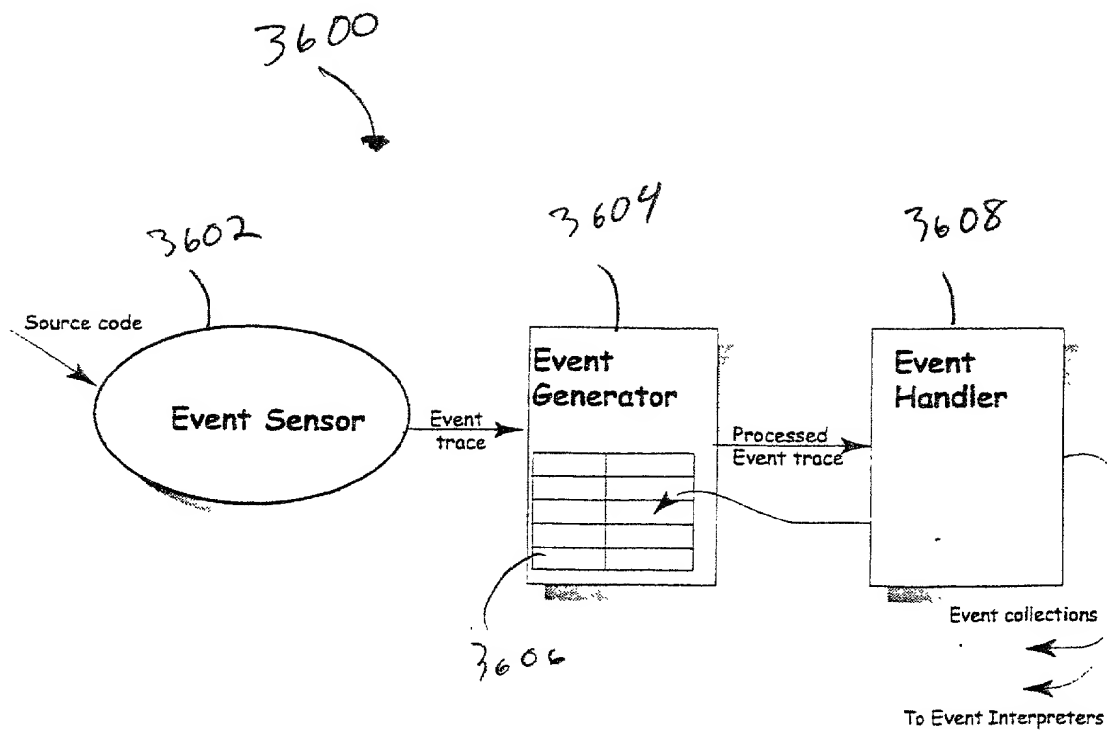Event collections
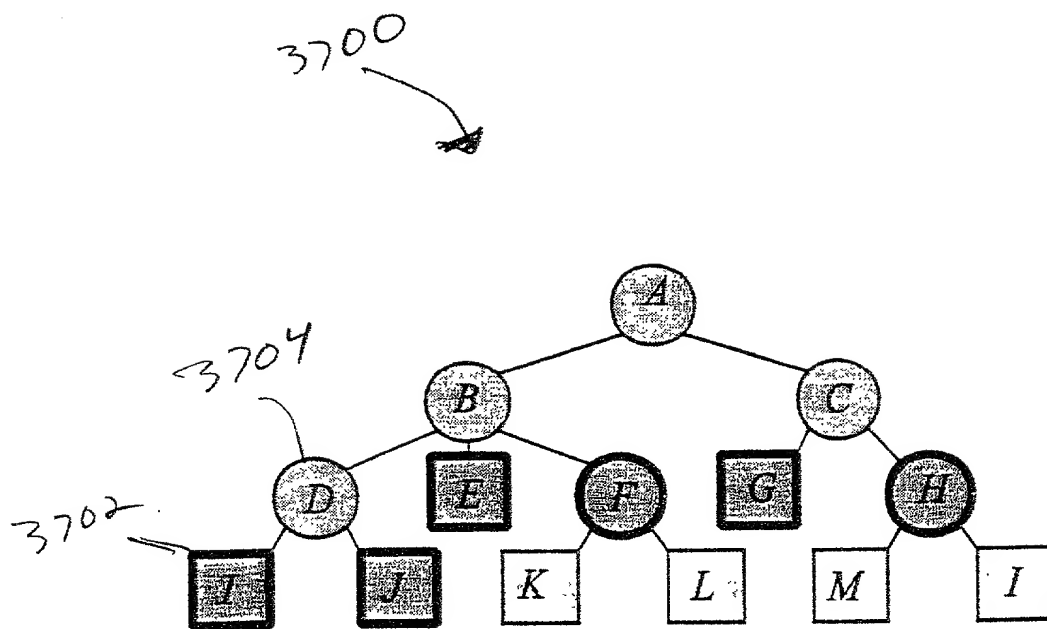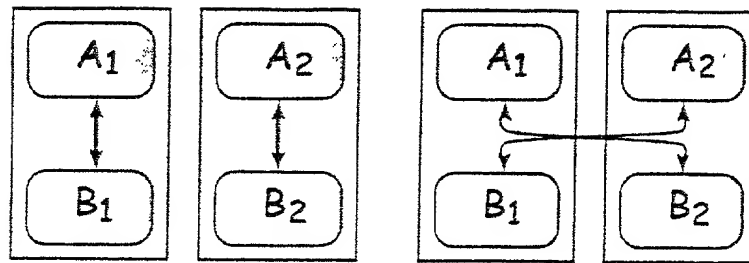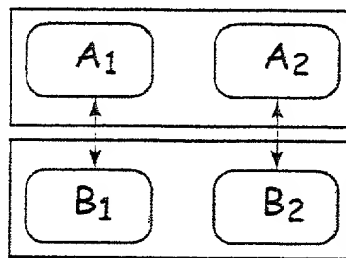
To Event Interpreters

Figure 36

3700

3704

3702
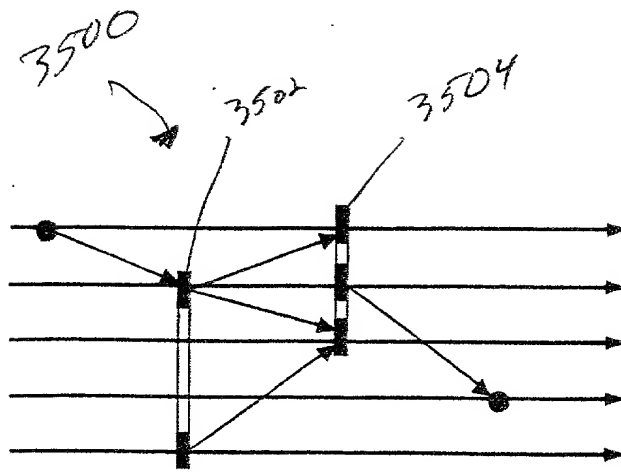
Figure 37

(a) Cohesion(P) = 1.0
Coupling(P) = 0.5

(b) Cohesion(P) = 0.0
Coupling(P) = 1.0

(c) Cohesion(P) = 1.0
Coupling(P) = 0.5

Figure 38

Figure 39

4000

P₁ ──(A)──────────────────(E)──────→

P₂ ──────(B)──(C)──(D)──────→

4002

P₁

E ● ● ● ● ⊥
A ● ● ● ●
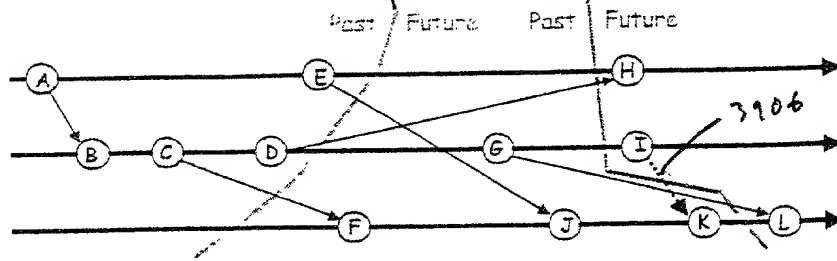⊥   B C D   P₂

⊤
↓
A-
↓   ↘
AB   E-
↓ ↘   ↓
AC   EB
↓ ↘   ↓
AD   EC
↓   ↙
ED⊥

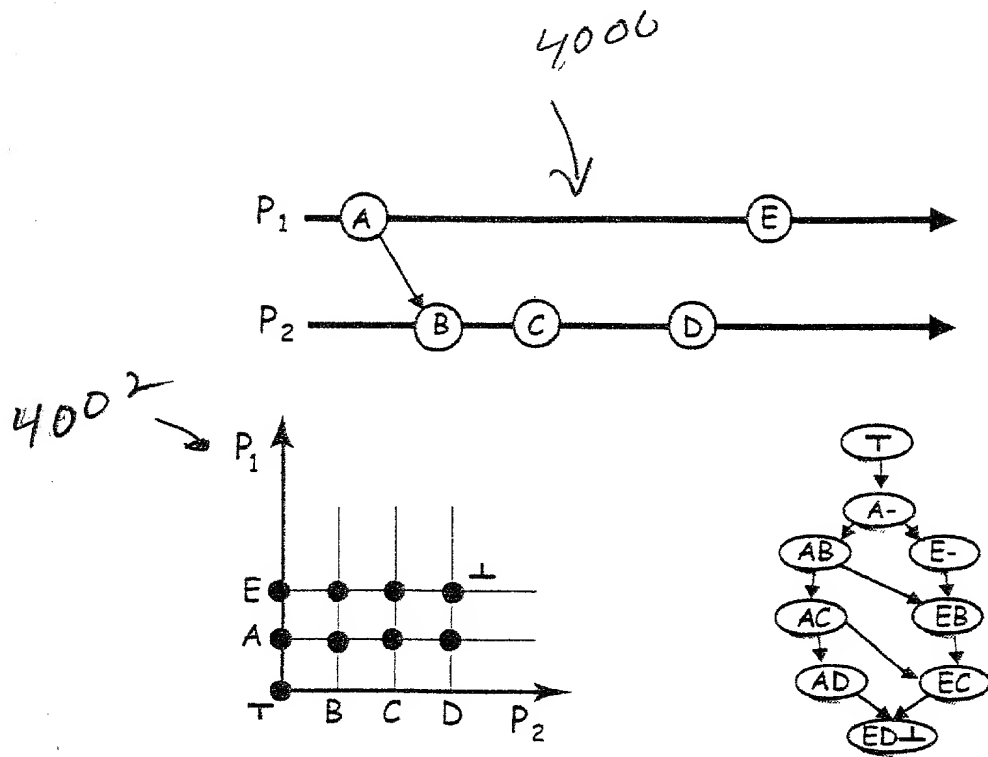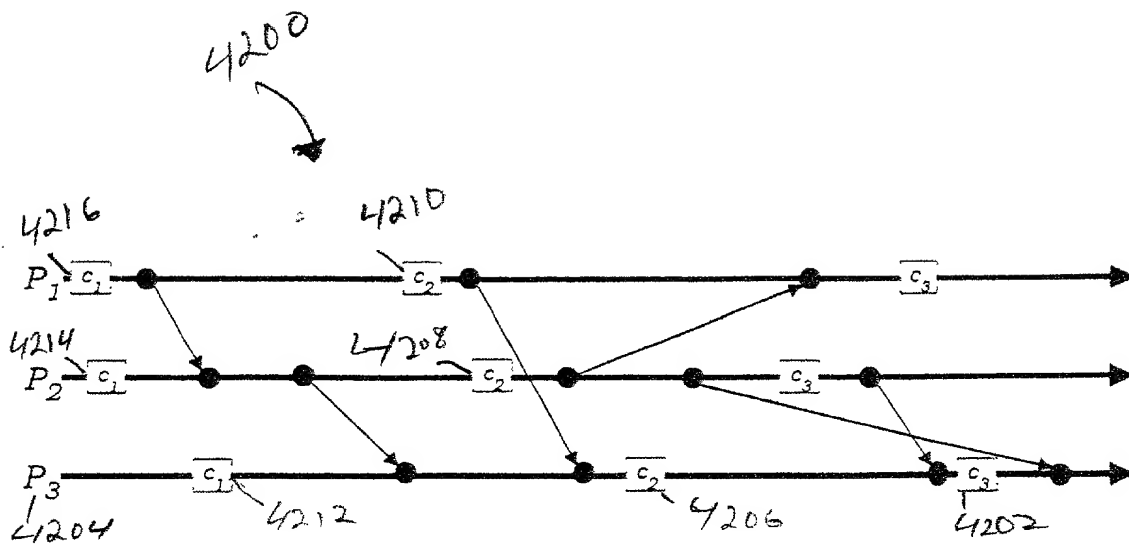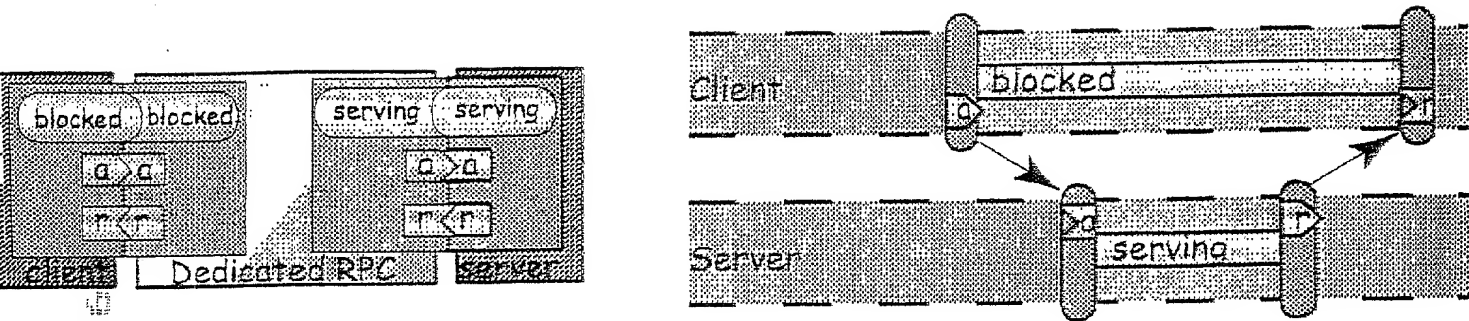Figure 40

Figure 41

Figure 42

Figure 43

event   mode change receive   send
           event   event   event

Figure 44

A   Simple control state

X:8   Variable value

X>7   General control state

Figure 45

Figure 46

Note: "Ringing" mode missing

Voice

GUI

Call-in-progress.

Call-in-progress.

Block address

Serving

Address Book

Connect I

Call-in-progress.

Connection

Figure 47A

Note: Missing event record

Voice

GUI

Call-in-progress.

Call-in-progress.

Block address

Serving

Address Book

Connect I

Call-in-progress.

Connection

Figure 47B

Sound Coordinator

White noise

Sound Generator

White noise

Figure 48

```
if(resource.take)
    resource.take();
    send(s, "granted");
)
else {
    send(s, "fail");
}
...
```

```
...
send(N, "getResource");
while(!new(N));
...
if(b)break;
performAction();
send(N, "release");
...
```

```
...
send(N, "getResource");
while(!new(N));
c = get(N); ...
if(isreq(s, "grant))
    d = getAddress()
...
send(x...) //crash
```
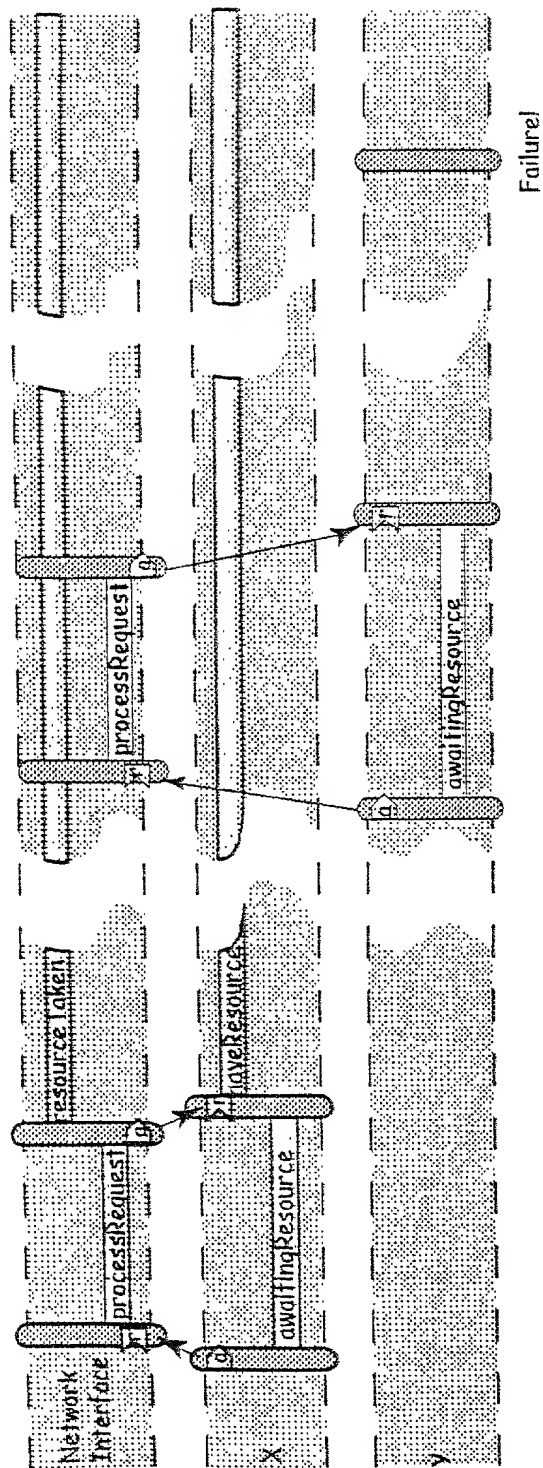
Network Interface

X

Y

Figure 49

Figure 50
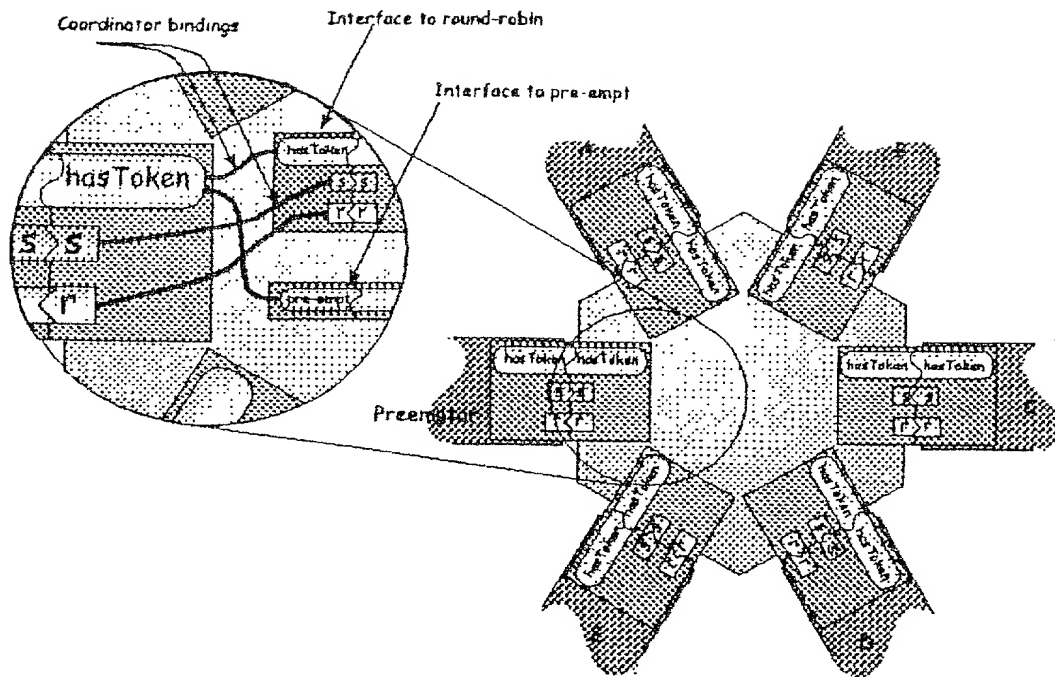
Figure 51A

Figure 51B

Frequent Preemptions
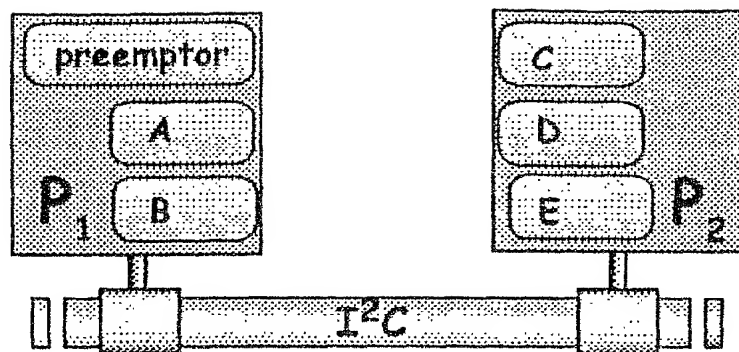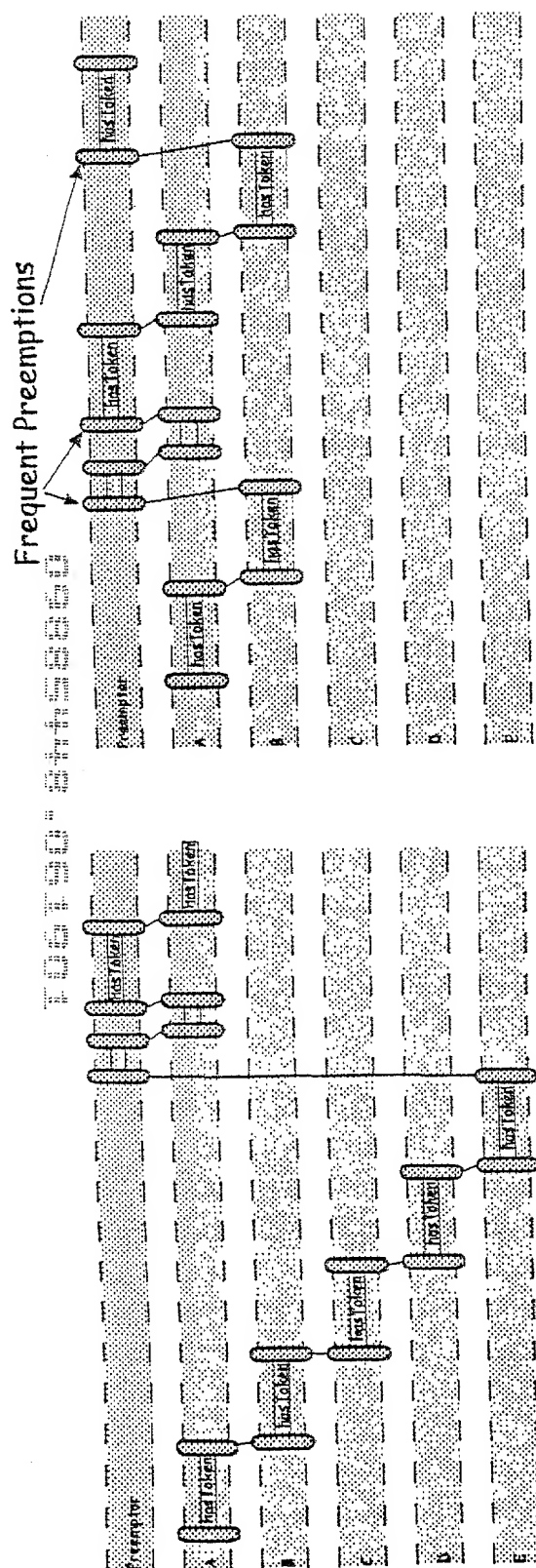
Figure 52A

Figure 52B
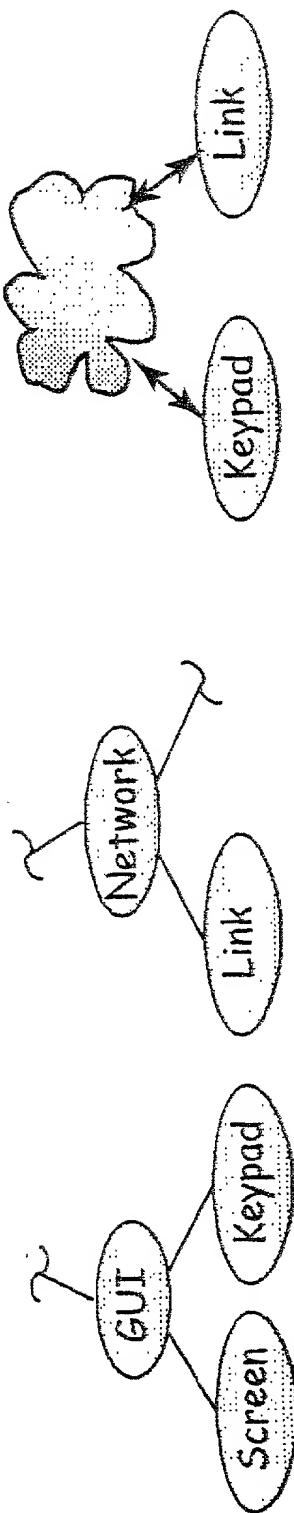
Figure 53A

Figure 53B

(a) Complete evolution diagram.

(b) After states on C_2's middle and bottom trace are clustered.

(c) After some of C_1's events are clustered.
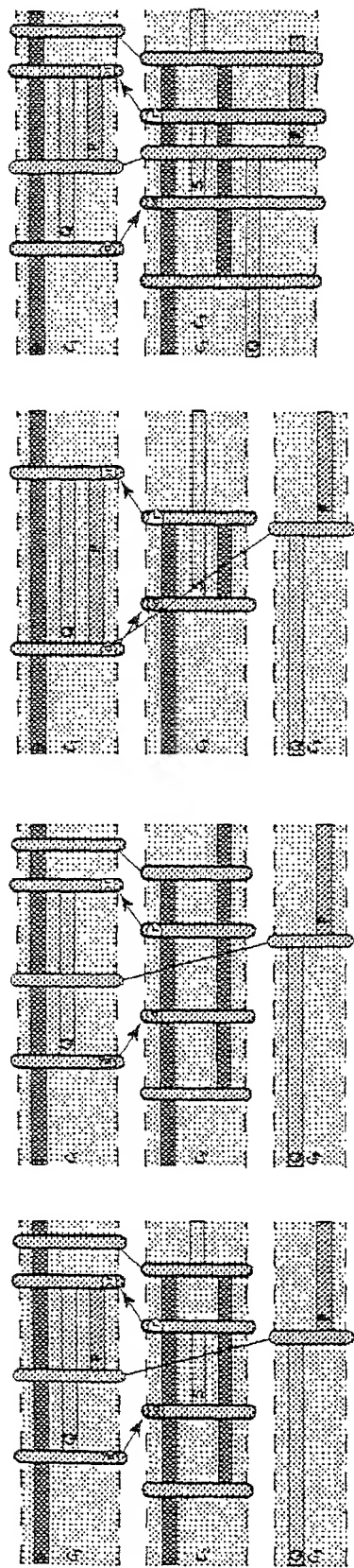
(d) After components C_2 and C_3 are clustered.
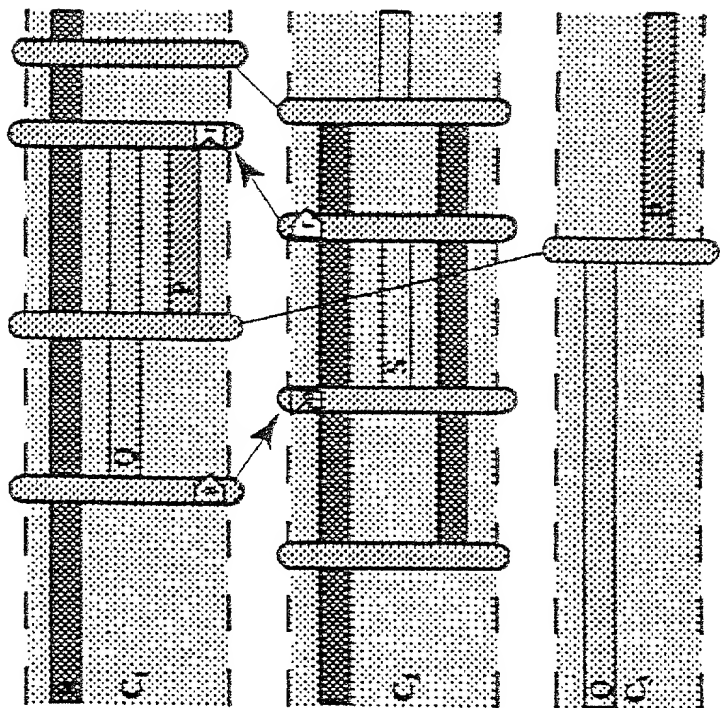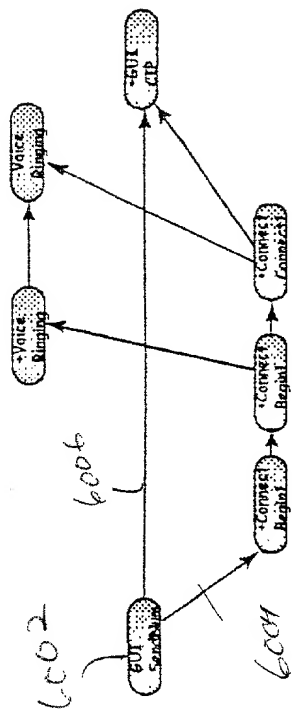
Figure 54

Figure 55A
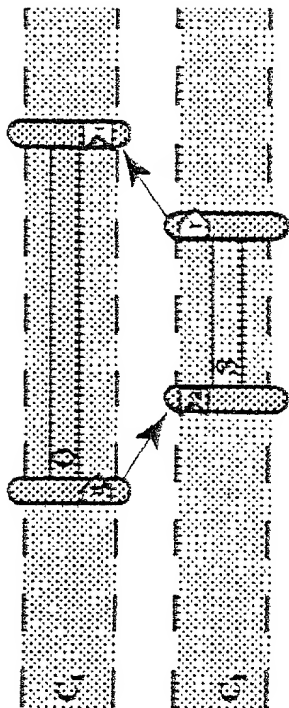
Figure 55B
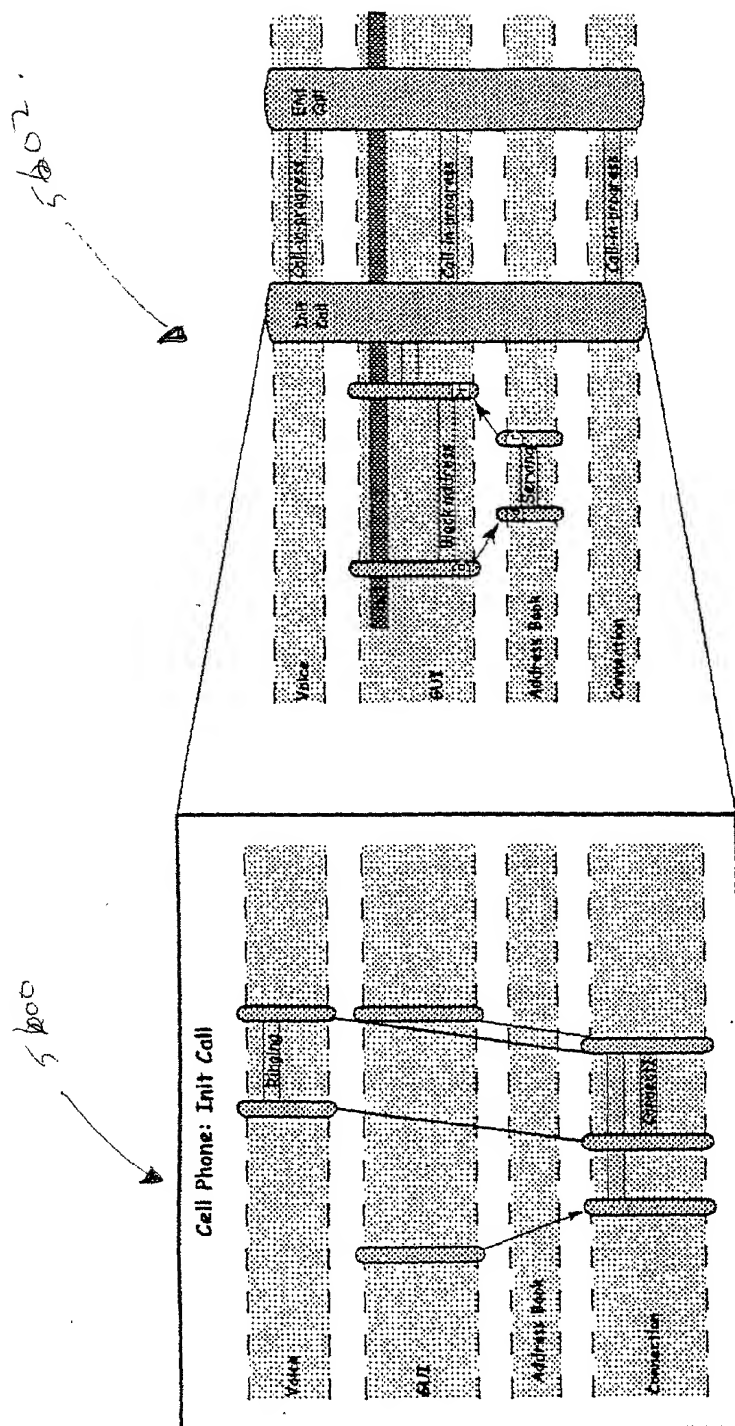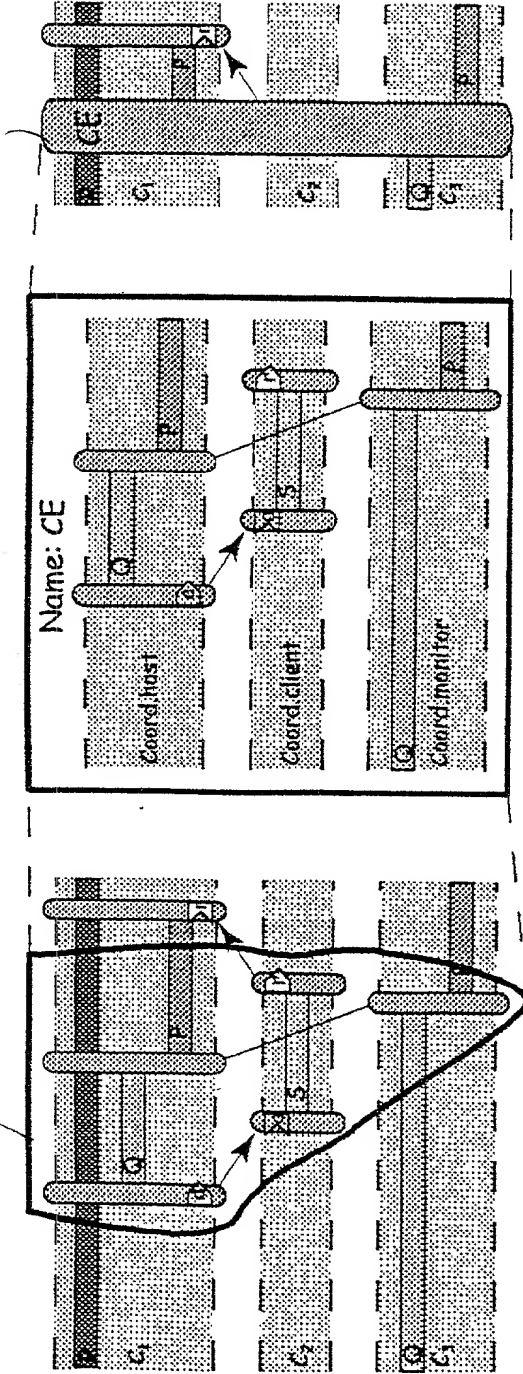
Figure 56
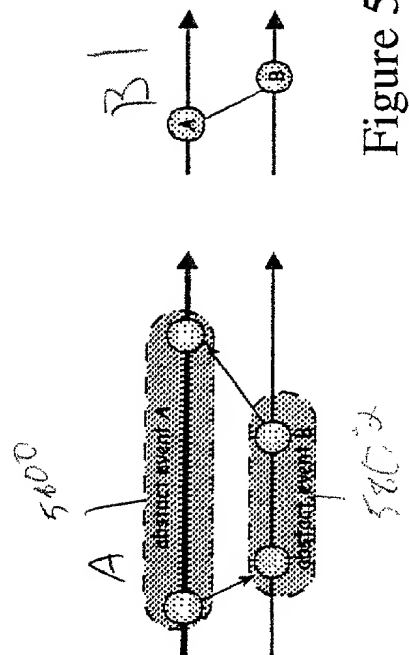
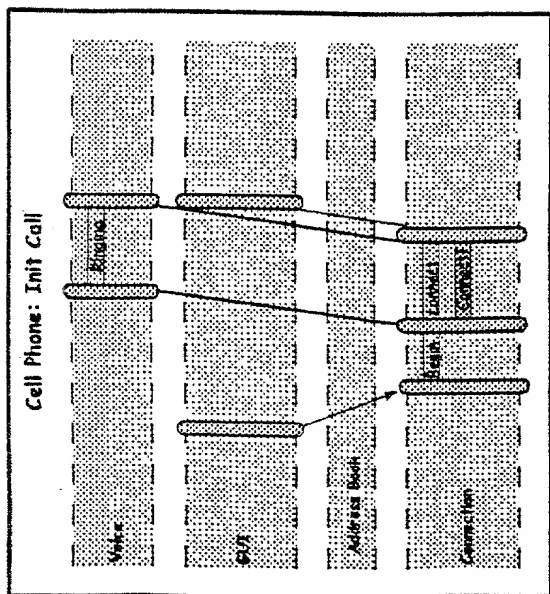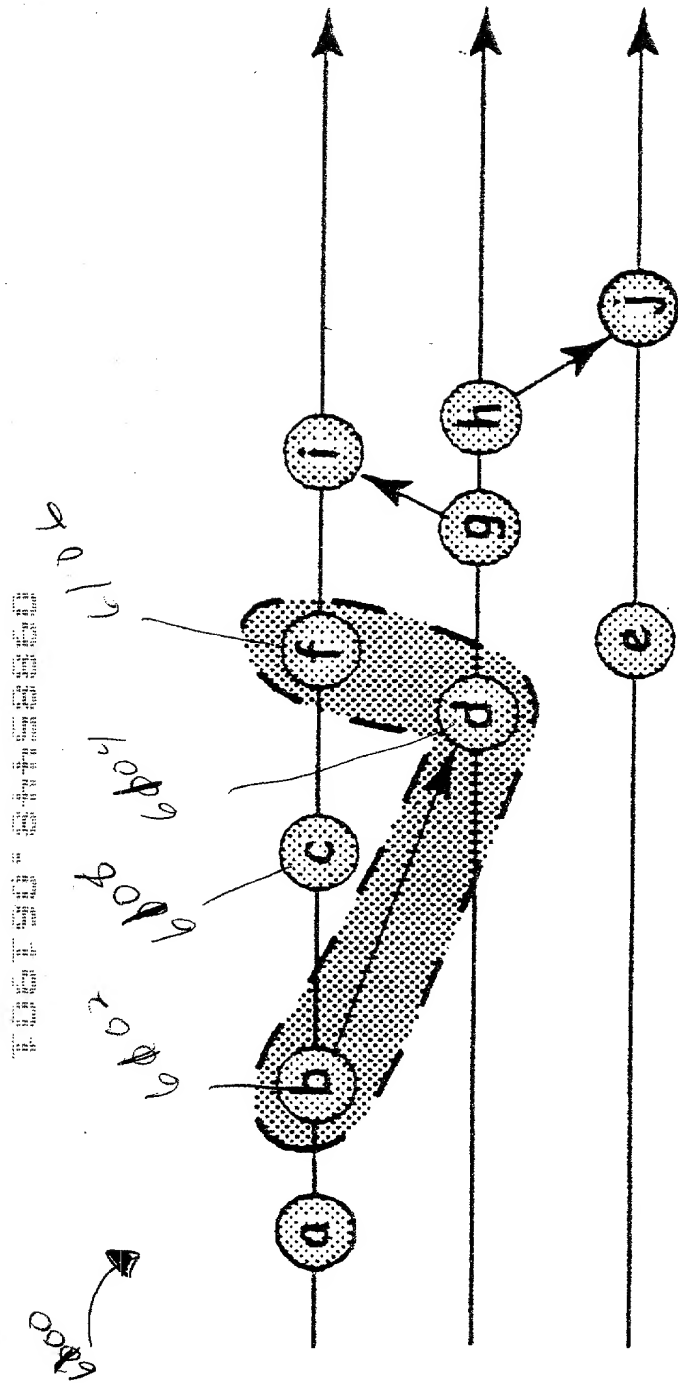Figure 57

Figure 58
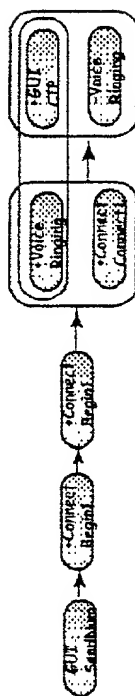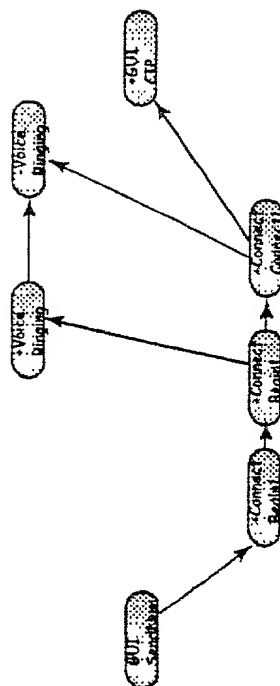
Figure 59

Figure 60

Figure 61
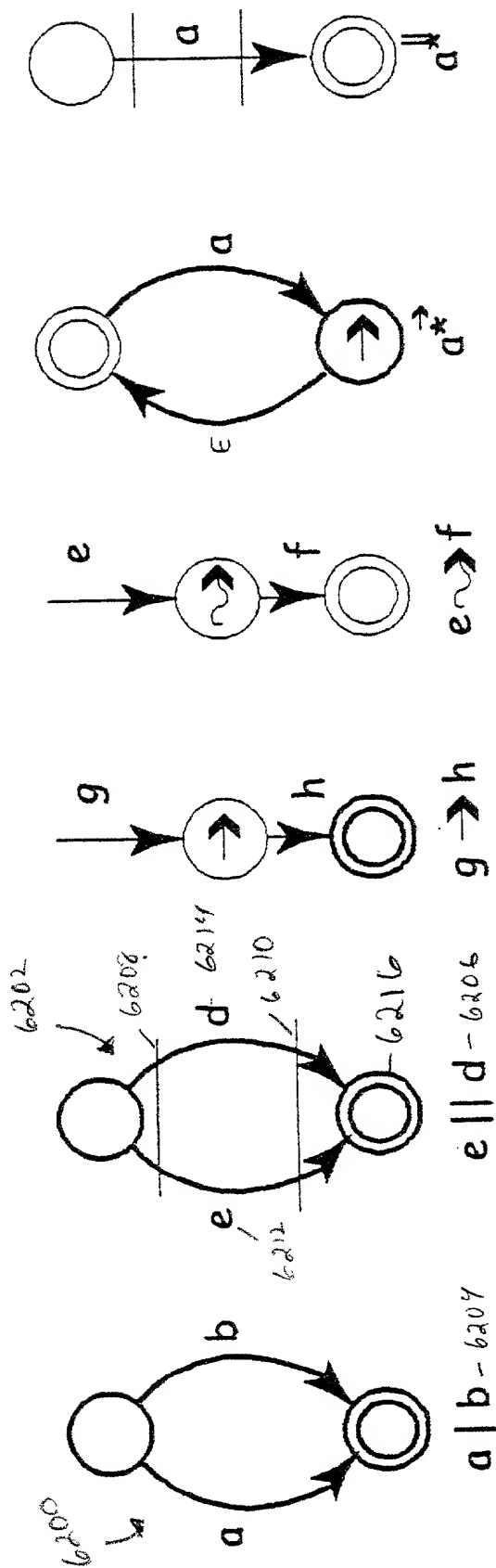
Figure 62
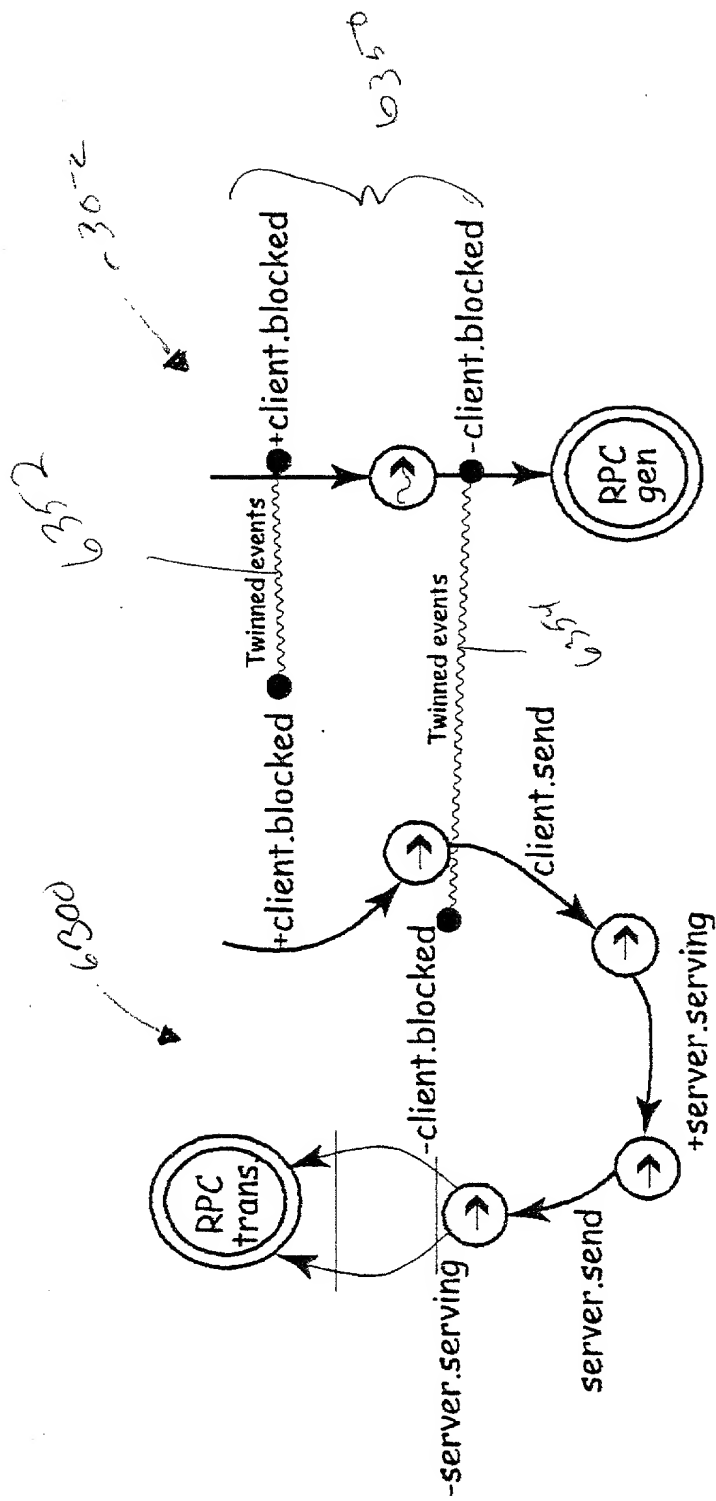
Figure 63

Abstract events

6400 — $A = a \rightarrow (b \parallel c) \rightarrow a$
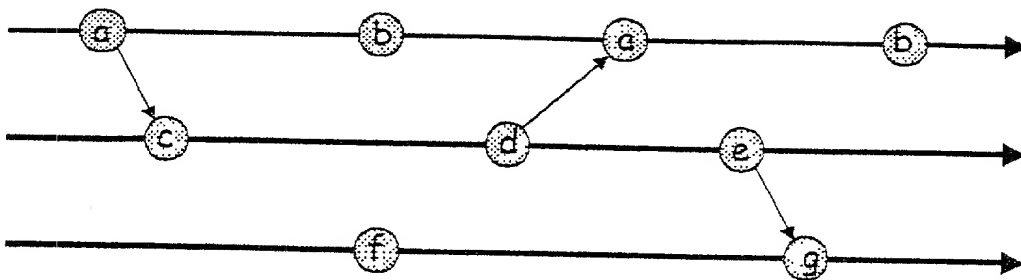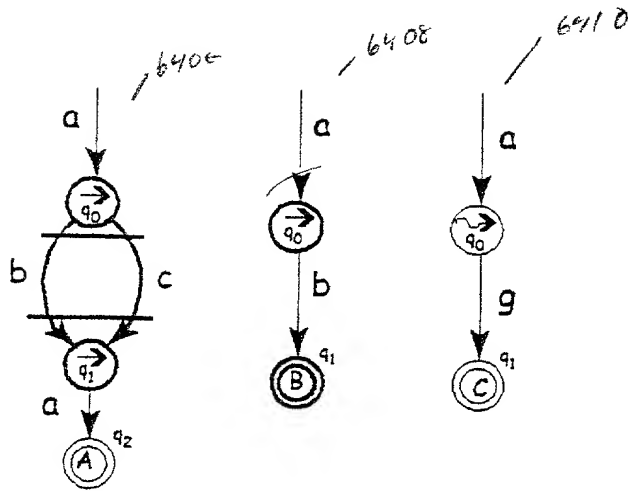
6402 — $B = a \rightarrow b$

6404 — $C = a \rightsquigarrow g$

Figure 64

Figure 65

Figure 66